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THE PRACTICAL TEACHER

SIR DANIEL MORRIS, K.C.M.G.

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EDUCATION IN PARLIAMENT.

THE SCOTTISH AND WELSH BILLS.

SO it was *not* an education session after all! After all, Pilot Graham Murray missed the port. He brought the Scottish Education Bill down the river, but sandbanked her in sight of the moorings. He retains his certificate as a master mariner, but something of his prestige is gone.

For several days before Mr. Balfour rose in the House of Commons, on August 2nd, to intimate what Bills he would jettison, and to propose that the House sit *de nocte in noctem* until the session finished, there had been rumours that the Scottish Education Bill was doomed. Ever since Ascot week it had been laid on the Parliamentary shelf; beer and tobacco had occupied and engrossed the attention of the faithful Commons, who had suffered the tortures of Tantalus in talking through torrid days about beverages, and through long, dull evenings about smokables, which an ancient by-law of Parliament forbade them to "bring to the table." It does not say much for the energy of Scottish M.P.'s that they allowed the Education Bill to remain on the shelf until it was too late to take it down this year; but perhaps it is true, as Opposition members say excusingly, that the Bill had ceased to be the popular proposal it was at the outset.

The Bill had become a Rating Bill as well as an Education Bill. The Government made again the mistake they made about the English Education Bill of 1896. Questions of area and of rating were imposed upon the Bill, and rivalries and local difficulties correspondingly multiplied. This was not the work of the Opposition alone, Scottish Liberal M.P.'s protest; they point to the activity of Sir Charles Renshaw, who is not the wisest man sent to Westminster from Scotland; and they denounce the devotion of Parliamentary time to the interests of Mr. Bung and the Laird of Toddy instead of to the schools and colleges of North Britain.

At any rate, and however or no, the Scottish Education Bill died on August 2nd, and the best that can now be said of it is that it forms an excellent *corpus* for the framers of a Bill next year. Mr. Balfour promised very definitely that next year should see the matter revived and dealt with, and it looks, at the present hour of writing, as if Mr. Balfour would be still the arbiter of Parliamentary programmes next year. In that event Pilot Graham Murray will get another chance, and better luck to him, gude man!

About the Welsh Bill, one can only say that it has added fuel to a fire. It had also been lying for weeks on the shelf, but it had been lying there in the character of a rod in pickle. Head-master Anson, sitting demure in his cap and gown, had been hoping that he need not take the rod out of salt. Negotiations were proceeding; tit-bits were dangled before the Welsh M.P.'s, *douceurs* for their palates, if only the Welsh councils would carry out the Education Law. Much was hoped by the peacemakers from a certain suggestion which offered Wales a kind of Education Department of her own. This was not to be a precedent for Home Rule—oh no! It was not really to be a Welsh Education Department; it was to be the Welsh branch of Whitehall situated in Wales. This idea may have come from the remembrance that Sir George Kekewich had a fishing-box in Monmouthshire which, with a pleasant irony, he dubbed "Whitehall." A Welsh branch of Whitehall, and a distinguished Welshman for its secretary—this was the tit-bit that made the mouths of Welsh M.P.'s water the most.

So Head-master Anson doffed his cap and gown, put on wading boots, and stood confessed a fisherman. The Bishop of St. Asaph withdrew from the water, reeled up his Compromise Bill, and stood out of the sun. For

weeks Sir William Anson whipped the Dee, the Usk, the Llugwy, and the other Welsh waters, so to speak, but after all he had to go to a second reading with his Defaulting Authorities Bill.

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"A coercive Bill," said Mr. Lloyd-George. "A peddling, tinkering, meddlesome little Bill," said Mr. Lloyd-Morgan. "A Welsh Coercion Bill," said Sir Alfred Thomas. "A Bill to see that this Legislature shall not be flouted," said Mr. Balfour. "A Bill to abolish conscience," said Sir Henry Campbell-Bannerman. "A Bill to secure to the children of Wales the beneficent provisions of the Act of 1902," said Sir John Gorst. "A condemnation of the policy of the Act of 1902," said Mr. Alfred Hutton. "A Bill to prevent teachers and children being made the shuttlecocks between parties playing out the religious strife," said Mr. Gray. "A Bill to embitter existing feeling," said Mr. Bryce. "A futile Bill, a Bill to badger and harry small authorities," said Dr. Macnamara. "A Bill to do justice," said Sir Francis Powell. "A Bill to increase and emphasise the differences between Nonconformists and Churchmen in Wales," said Mr. Abel Thomas. "A clever Departmental prescription for securing temporary relief from the worst symptoms," said Mr. Edwards, winding up the debate and accurately defining the measure. "And it being half-past Five of the clock, Mr. Speaker proceeded to interrupt the Business; Whereupon Sir William Anson rose in his place, and claimed to move 'that the Question be now put.'"

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Question put—"That the Question be now put." The House divided:—Ayes, 226; Noes, 104. Question put accordingly—"That the words proposed to be left out stand part of the Question." The House divided:—Ayes, 245; Noes, 111. Bill accordingly read a second time, and on August 5th the Bill went into Committee.

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Now August 5th was a Friday—the Parliamentary half-holiday day—the early closing day of the dealers in legislation at St. Stephen's. But on the previous Tuesday the standing order which shuts up the shop at half-past five on a Friday had been repealed. This was irritating to the week-enders, both Governmental and Opposition. Thunder was in the air outside St. Stephen's that afternoon; thunder was in the air inside it too. About half-past four the storm burst. It was the Closure that burst it.

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The Welsh M.P.'s had elaborately digged pitfalls and sown coulters in the path of the Bill. Eleven pages—foolscap pages—of them there were, some three hundred several amendments. From 12.15 to 4.15 two amendments had been discussed; at the rate of two hours to an amendment the House would need to sit six hundred hours continuously to get through with the Bill. Mr. Balfour took into his hands that cutlass the Closure, and hewed a mighty stroke. The blow shored off four pages, or a hundred amendments. The flash of the steel was as the lightning of the tempest: down came the clouds that had loured upon the chairman's head.

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Every Welsh member in the House, and a good many English and Scottish Opposition members also, declined to proceed to the Division Lobby. They sat glued to their seats. "Mabon," who weighs some sixteen stone, called for the Deputy Sergeant-at-Arms (who weighs ten) to carry him out. All the other members came crowding out of the lobbies into the Chamber to witness and enjoy such a feat of arms. But it did not happen. The chairman was very suave and patient, Mr. Lloyd-George was placable. Mr. Lloyd-George said that the Welsh members would "take no more part in this farce." "No more will the other Opposition members," said Mr. Asquith, and then in solemn silence the Opposition filed out. In five minutes the Bill was through Committee, and its perilous course was past. So by the irony of Parliamentary fate the Welsh have got an Education Act they do not want, and the Scotch have lost the Education Bill they longed for. With such wisdom are we governed; such a humorist sits at the control of affairs, and laughs!

BY MANY HANDS.

"Quot homines, tot sententiæ."

EVENTS that are happening in the Far East have turned all eyes in that direction, and everything concerning the condition of the two countries at war has a more than passing interest for the general reader. The following items, drawn from the most recent report available (that for 1900) on the state of primary education in Russia, will help readers of the *Practical Teacher* to form some idea of the internal condition of that huge empire. With a population of nearly 130 millions, there were 79,000 primary schools, with an attendance of 4¼ million pupils. But 97 per cent. of these schools (nearly 77,000 in number) are primary schools of the lowest type, where instruction is given only in reading and writing, leaving 2,000 to 3,000 schools where, in addition, subjects of general information form part of the programme. Taken generally, this gives some criterion of the amount of ignorance spread over the Russian Empire, though it would be idle to think that all parts are equally badly off. In so huge a country the population is spread with very uneven density, so that while some parts, notably in the centre and north-west, where towns are large and population is dense, are comparatively well provided with schools, others are in a wretched condition. Thus, the governments of Petrokov and Saratov have one school for every 18,000 to 19,000 inhabitants; that of Kherson, one for every 24,000 inhabitants.

Concerning Russia—

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THIS of itself will show the difficulties under which the Russian peasant labours in his search after instruction, since these figures represent the state of things in the thinly-populated and enormously large districts of Southern and Eastern Russia—districts that are largely agricultural. Naturally, when we come to the figures for Russia in Asia, these conditions are exaggerated, as a glance at the map would lead one to infer. But even in this octopus-like empire much progress has been made, for in 1885 there was, taking Russia generally,

And its Schools.

BRITISH MUSEUM

but one school to every 2,700 of the population; yet in the return from which we quote there is one school for every 1,700 inhabitants. Or to put it in another way, during these years the population increased 19 per cent., the schools 92 per cent. This speaks for the sincerity of the general progress; and of individual districts, it is the little-known one of the Caucasus which outstripped all the other parts of the empire in the number of the schools it founded in proportion to its population.

BUT the full force of the figures can best be seen by thinking of our own country, when it is at once brought home that England, with one-third of the population of Russia, outstrips it in the number of children in its primary schools.

Hope for the Moujik.

On the other hand, when one considers that less than fifty years ago the mass of the rural population of Russia was in serfdom, the awakening that has been going on in the dense heart of its people is astonishing, and augurs well for future progress. One great drawback exists. Primary education, instead of being unified in its administration, is controlled by no less than *nine* different ministries, though the larger bulk of the schools depend on two—that is, the Ministry of Education and the Ministry of Cults. When one adds to these the multifarious confessional, philanthropic, and local authorities who also engage actively in school management, the chaos of the system becomes apparent. The great hope for the future lies in the immense progress that has been made since the emancipation of the serfs, and in the evident determination of the people to be instructed at all costs.

Next month we may be able to give some figures respecting the educational schemes and progress of Russia's antagonist—Japan.

WITH OUR CHILDREN.

"NEVER prophesy unless you know" is a safe rule, and one which we observe in most cases. As regards the systematic study of children, however, we have in this column now and then ventured beyond the known, and prophesied that this study would certainly form a part of the training of teachers ere long. We are glad to find that enlightened opinion is already leading to movements in that direction in more than one training college. We have now to note an indication of the trend of official opinion (which is not always synonymous with enlightened opinion) in the same direction.

Our little Prophecy.

WE have before us the "Report of the Inter-Departmental Committee on the Model Course of Physical Exercises," and it is in this interesting document that we find the indication to which we refer. That Committee was presided over by Mr. John Struthers, C.B., Assistant-Secretary of the Scotch Education Department, and one of the most enlightened and practical educationists of the day. To those who have watched the course of events in Scottish education since Mr. Struthers put his high ideals and his wide experience at the service of Dover House, and who know that Dover House circulars can do more for education through the medium of the post-office than the Government can do through the agency of King, Lords, and Commons, the report of this Committee comes with special force and significance.

A Notable Report.

WE do not intend to summarise or to criticise the report at present. We have merely one quotation to make. "It is obvious that the exclusion of children" (from any course of physical exercises, that is, on account of insufficient nourishment or constitutional weakness) "must necessarily be made in the first place by the teacher on his own responsibility. It will probably be found that the more experienced teachers will be able to make the selection without any difficulty; but as regards future teachers, we suggest that suitable instruction in the laws of health and in the outward signs of physical and mental weakness should receive a much more prominent place in the general scheme for the training of teachers than appears to have been the case hitherto."

We quote.

THIS is good, but what follows is still better:—"For this purpose no mere bookwork instruction, such as may be necessary for passing written examinations in physiology and hygiene, is sufficient. The instruction should include a certain amount of, so to speak, clinical experience. The students should be made acquainted practically with the indications of normal health and normal physique, and taught how to recognise probable deviations from this standard. They should be able to recognise such signs of defective nutrition and such defects of sight, hearing, and breathing as require medical attention. They should also be familiar with the signs of fatigue, physical or mental, which to the experienced teacher are the gauge on which he keeps his eye in regulating the work of a class. In short, they should have practical experience of many of those forms of investigation which are grouped under the heading 'Child Study.'"

Quotation Continues.

NOT for many a day, if ever, have we read an official pronouncement on education with so much pleasure. True, this is not a legislative utterance, but it is more than a straw which shows the direction of the wind; it is the first breath of the wind itself. The Committee included practical teachers of wide experience, and seems to have been particularly exempt from the presence of faddists. And, as we have said, the chairman is one who knows the art of translating thought into action. "Child Study" may, therefore, be said to have reached the horizon at least, and will shortly be visible to the naked eye of all teachers in training. We congratulate those teachers.

Child Study on the Horizon.

IF modesty and the editor permit us, we should like to add a modest word of congratulation to ourselves, just in case that no one else should think of doing this graceful act. The aim of these paragraphs from month to month has been to arouse interest in Child Study, and to show that it is not a fad, nor a luxury for the mental epicure, but a necessary of professional life for every teacher. The study of children, of course, includes much more than the consideration of their physical condition with its implications. Yet if we could feel assured that the voice of this journal had done something to arouse the feeling of the importance of Child Study which this report evinces, we should yield quietly for a moment to the temptation of feeling rather proud of ourselves and our journal.

Our Congratulations.

Meantime we must rest content with the triumph of common sense over tradition, and postpone our personal triumph until—well, until we are quite sure we *have* triumphed. Meantime the "spade work" must go on.

N.U.T. NOTES.

FOR some weeks there has been running in the *Schoolmaster* a series of articles entitled "When I was a Pupil Teacher," written in the main by prominent Unionists of both sexes. I was honoured by an invitation to contribute my own reminiscences; but for the same reason that the schoolboy's essay on "Snakes in Ireland" was more or less of a failure, these are not forthcoming. Most of the articles have been interesting, and some few amusing in addition; yet possibly the one to attract the most attention was from the pen of my friend and colleague Mr. T. P. Sykes of Bradford, who had the courage (and some say the hardihood) to incorporate in his contribution the following words: "*The master should be the master of his own school*, and that for the sake of the children committed to his care. If he be not fit for that, he had better be set to break stones on the roadside. He has missed his vocation. Degrade the master, and you injure the child. Spy upon him, test him, report upon him, assess his work in £, s. d., and you injure the children a hundredfold. Therefore I am not going to have anybody, however learned or however reverend, coming to my school (with apologies to the Education Committee of the city of Bradford) if I can help it. I love my boys and girls too much for that. It would be a calamity. They do not do it at the Bradford Grammar School, or at Eton, or Harrow, or Winchester; then why at Great Horton Council School?" Some months ago Mr. Sykes had "thrown his cap into the ring," ready to do battle for what he considered reasonable remuneration for the teacher's services when contrasted with that of other municipal employees. The incident had evidently rankled, for some local busybody made it his business to construe the above manly declaration as a "revolt" against all discipline, demanding serious and immediate attention. Happily Mr. Sykes's position is so strong amongst the non-professional portion of the Bradford community that he is not likely to suffer from the vindictiveness of anybody, however exalted. What Mr. Sykes had thrown into an acute personal form—"that the competent teacher should be subject to the least amount of outside interference possible"—will be readily accepted by every enlightened education committee man. An unpleasant incident in the discussion was a letter written to the *Bradford Telegraph* by a teacher under the Bradford Council (whose name is immaterial), insinuating that it was all an election dodge. I never read more unworthy innuendo than, "Mr. Sykes is a candidate for the vice-presidency of the Teachers' Union, and as his constituency stretches from Land's End to John o' Groat's [*sic!*], he needs a big drum indeed to reach so far." Strangely enough, the writer of the above is *a member of the N.U.T.!*

"Master in his own School."

NO more "burning" professional question exists, to my mind, than promotion to head-teacherships from the ranks of the class teachers; and the more I ponder the matter, the more fully I realise how enormously difficult it is to-day to devise a scheme which shall be absolutely just and equitable, and fair all round. Thirty years ago, when but four or five per cent. of the whole body of certificated teachers were not in charge of a school or department, the selection of head teachers was comparatively simple. Now that the class teachers are in a substantial majority, and that there is a continually increasing tendency to employ adult certificated teachers in the big town schools, promotion becomes more and more a lottery—a matter of chance. As far back as 1890 I opened a discussion on the question at a meeting of the Nottingham Board Certificated Class Teachers' Association. I advocated memorialising the Board to settle first of all the educational qualifications of future head teachers, and then promote by seniority in the Board's service. I was hopelessly beaten, largely, I recollect, by the votes of the younger members, who saw that such a scheme would not suit them at all. Perhaps it was just as well that my ideas did not prevail, for I have lived long enough to know that academic distinction and superior paper qualifications are not everything. Many of the most successful teachers—head and class—I know have only managed to secure (say) a third division in the Certificate Examination; yet they are singularly resourceful in ideas, and effective in carrying them into execution. And their splendid practical work ought to be duly considered. Not long ago the M.B.T.A. formulated a scheme of promotion which contained practically all the essentials, and was acceptable to the teachers concerned. Now the Education Committee of the L.C.C. has tried its prentice hand, and it remains to be seen whether its labours will give satisfaction. There is to be a promotion list, containing the names of 75 men and 150 women, half the latter being teachers in girls' schools, and half in infants' schools. Any class teacher who has the experience prescribed by the committee's regulations may apply to have his or her name placed on the list. The managers have to express their views as to the applicants from their respective schools, and the council's inspector will also furnish a report. The applications ultimately reach the educational adviser, the executive officer, and the chief inspector, who will make recommendations to the teaching staff sub-committee, "giving in writing their reasons for the recommendation." Two things strike me prominently in this latest scheme: first, the enormous power of the council's inspectors; secondly, the wonderful self-abnegation of the members of the authority in foregoing their hitherto valued bit of patronage. Backstairs influence will henceforth be at a discount, which is all to the good: but a greater evil will arise if the new scheme leads to toadying to the inspectors.

Class Teachers' Promotion.

"NO. 3" of the *Quarterly Notes* issued by the Board of Management of the Teachers' Provident Society has made its appearance, and from its pages I am glad to learn that the little periodical is proving useful in many ways. It is becoming quite a common thing to see extracts from the last issue inserted as footnotes to the agendas of the various association meetings, and only recently a whole page of a journal issued by a large association in the north was filled with paragraphs culled from *Quarterly Notes*. Mr. Golding and his Board do not complain of this. On the contrary, they rejoice; for the more publicity the society and its work receive, the greater the prosperity of the members. Quite one of the most useful paragraphs in the last issue deals with the very important topic of "Rebate for Income

"Quarterly Notes."

Tax." When such tax was small, the rebate was comparatively trifling; but with an income tax of a shilling in the pound, and no great likelihood of a material reduction, a careful man is on the *qui vive* to accept the relief the law affords. Last month the Board of Inland Revenue decided to allow rebate for income tax where the life assurance contributions are paid *monthly*. Before that time, members of friendly societies were required to pay their contributions at least *quarterly* in order to be able to claim this relief; and even then, in many cases, obstacles were placed in the way of members by surveyors of taxes in certain parts of the country before they were able to obtain what was their right. Mr. Golding advises members whose incomes exceed £160, in filling up the yellow form giving particulars of their income from all sources, to deduct from the gross amount of their income the sums paid to the society as premiums for life assurance; and the counsel will be followed with alacrity. The surveyors naturally have the right to demand to see the receipts for the premiums; and when this is done, the passbook is sufficient evidence of payment. 'Midst a column of "Brevities" I find the following:—

> "Object VIII. of the N.U.T. runs: 'To promote the welfare of the Teachers' Provident Society and the Teachers' Benevolent and Orphan Fund.' The order is quite right. The T.P.S. first, and the others to follow. Provide for yourself and your own first, and afterwards give all you can for the cause of charity and benevolence."

The advice is practical enough in all conscience, and although it "jarred" a little when I first read it, I am bound to acknowledge that if all teachers would avail themselves of the advantages offered by the T.P.S., there would be infinitely less work for the B. and O. Council to undertake.

* * *

Objectionable Regulations.

FEARFUL and wonderful are certain of the regulations drawn up by the new education committees regarding the teachers in their schools. Moreover, some of these are so unfair that, as a rule, if representations be properly made, and in the right quarter, reasonable modifications are at once introduced. As an instance of what I consider unfair regulations, I take the following from the code of a well-known Midland county:—

> "A notice of resignation given by a teacher for any month which includes any part of the summer holidays will not be accepted, unless the teacher consents to forfeit the salary for the period of holiday."

It is, I know, quite possible during this season of exceptional "dearth" for young assistant teachers to take up appointments shortly before the holidays, and then hand in their resignations so as to include part of the holiday period. Though one naturally deprecates such a plan of action, it must be recognised that it is extremely inconvenient for teachers who are taking up new appointments to have to sacrifice a part of their holidays; and under the regulation quoted above, it is not possible for a teacher to proceed to a new sphere of labour after the holidays without losing money. Obviously, too, it is more convenient both for the teachers and the education committees that new appointments should commence after the termination of the summer holidays, now that so many schools inaugurate a new educational year from that epoch. In the case of teachers of over a year's standing, I unhesitatingly describe the attempt to deprive them of either the holiday or the salary as a flagrant injustice. They have been appointed at a salary of so many pounds per year, and this undoubtedly includes the four or five weeks' holiday, which in ninety-nine per cent. of the cases has been earned many times over. To meet the difficulties and necessities of the case, the N.U.T. Executive have, on more than one occasion, suggested that clauses like the above should apply only to teachers of *less* than one year's standing, and this suggestion has met with the approval of the authorities concerned. Were the above regulation to read, "A notice of resignation given by a teacher *of less than one year's standing in the service*, etc., etc.," no very grave injustice would be done; but certainly this is *the least* concession that a self-respecting body of teachers can be expected to accept.

* * *

Teachers' Clubs.

A MEMBER of the Executive ought to be—whatever he actually is—the "embodiment of everything that's excellent;" and, in addition, he should possess a full, true, and particular knowledge of every phase of Union activity, not only in his own neighbourhood, but in the rest of the country. Many times during the course of a year I am asked questions which neither the *Times* Encyclopædia nor any other edition could supply the answer of; and one question I frequently receive is, "What do you know about teachers' clubs?" I might answer quite correctly, in the words of a song in vogue over a score of years ago, "Not much." Certainly I remember how, at the Bristol Conference of 1902, the local Teachers' Club entertained the visitors at a very successful symposium, under the hospitable roof of the Royal Hotel, College Green, where, I understand, on one or two evenings per week, rooms are reserved for the local members. The city of Birmingham rejoices in two teachers' clubs—the Arnold, for head-masters only; and the Spencer, for certificated class masters of Birmingham and district. Each has its own quarters, and each is, I believe, successful and greatly appreciated. The Spencer Club makes provision in its rules for honorary members, and one of my proudest recollections is that I am the only honorary member who has not lived or laboured in Birmingham. The club rules state that—1. A nomination for honorary membership shall be supported by at least twenty signatures. 2. The number of honorary members shall not exceed ten. 3. Honorary members shall be elected for a period of three years, and shall be eligible for re-election on the recommendation of the committee. The club meets on Friday evenings at seven o'clock, and last year's programme gives some idea of what the members do:—Oct. 30. Members' Smoking Concert. Visit of Mr. J. Cuming Walters. Nov. 6. Whist Tournament. Nov. 13. Social Evening. Nov. 14. Visit to Mr. J. Cuming Walters at Manchester. Dec. 4. Smoking Concert. Dec. 11. Eighth Annual Soirée. Dec. 18. Paper: "Wordsworth's Ideal of the Education of Children"—Prof. J. H. Muirhead. Dec. 25, Jan. 1, Jan. 8. Christmas Vacation. Jan. 15. Smoking Concert. Jan. 29. Discussion: "The Need for a Professional Code of Honour for Teachers"—opened

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THE PRACTICAL TEACHER'S ART MONTHLY
for September.
With Large Supplement.

by Mr. E. C. Pritchard (Vice-President of the N.F.A.T.). Feb. 12. Debate: "That Present-day English Literature has fallen considerably below the Standard set up by Past Writers." Affirmative, Mr. A. Powell; negative, Mr. E. R. Gosling. Feb. 26. Smoking Concert. Guests, the members of the College Clubs. Mar. 4. Visit to Walsall Spencer Club. Mar. 11. Bohemian Concert. Mar. 18. Paper: "The Literature of the Kymry"—Mr. E. C. Pritchard. Mar. 25. Paper by Mr. J. Cuming Walters (editor of the *Manchester Evening Chronicle*). This excerpt is an indication of the variety of entertainment and amusement furnished by the energetic and enterprising club committee. The Walsall Spencer Club is a flourishing "little brother." A. C.

NOTES FROM THE NORTH.

IN my last month's notes I voiced the pretty general opinion of Scottish teachers that the Scottish Education Bill would have great difficulty in passing into law during the present Parliamentary session. During the month rumour has been busy with its fate. One day the most discouraging prognostications were uttered; the next day hope was in the ascendant. Those teachers who were optimistic enough to say that the Bill would pass were no doubt influenced by "wish which was father to the thought." But all rumours are now set at rest. Among the "innocents ruthlessly slaughtered" at the end of the session is found the Teachers' Bill. The Prime Minister, in announcing its sacrifice, says: "There remains the Scottish Education Bill. That Bill has caused me a deal of anxiety. I had hoped at one time that it was a Bill which was not only in its main principles satisfactory to the people of Scotland and the members representing that country on both sides of the House, but that in its details it would not excite any prolonged discussion in this House. The Secretary for Scotland has not had quite the chance that I thought he might have got in dealing with the measure. We have now got into a period of the session in which, if there be any discussion required on the Bill, it seems to me impossible to find time to give the opportunity in another place for the discussion of the measure. I have made it my business to find out whether lapse of time has indicated in any way that the comment which the Bill is likely to excite will be of small volume. I regret to say that all the omens are unfavourable, and I fear it may not be possible for us to proceed with the Bill this session."

The Scottish Education Bill.

* * *

I AM philosophic enough to believe that there is "no use crying over spilt milk;" nevertheless it is necessary for future guidance to look at the reasons of the failure of the Bill. The general approval the Bill met with on both sides of the House and by the public may have contributed to its overthrow. It was on its introduction so favourably received that fears were expressed that it would be done to death with kindness. This, as a matter of fact, has actually happened. Those who were favourable to it spoke so long and so frequently at its second reading that two days were consumed in discussing a bare third of it. One thing is certain, that the teachers of Scotland have had no part in its legislative collapse. They have frequently sought to restrain their too ardent helpers. The prime cause of failure is the fact that the Bill was discussed in the House of Commons at all. Mr. Balfour now recognises this, and promises that on its re-introduction next session it will be sent to the Grand Committee. Whether the present Government will be able to hold together for another session is a matter of probability, but it is to be hoped that whatever party is in power the next Bill will be introduced earlier in the session, will be pushed with greater persistence by the Government in power, will be sent to the Grand Committee, there to be threshed out before it comes into the arena of so much talk, and as a result will perhaps be even bolder in conception than the present Bill. So out of present loss may come future and ultimate gain.

Who is Responsible?

* * *

THERE can be little doubt that the throwing out of the present Bill will entail greater work during the ensuing winter session on the committees of the Institute. They would have had enough to do to concentrate their attention on the subject of superannuation, which of all others should, during 1904–5, receive precedence, inasmuch as the septennial revision falls due in the latter year. I had hoped that the energies of the Institute could have been centred on that question, for to many of the younger teachers it is *the* question. However, there will require to be much attention given to both subjects. Much information requires to be gathered together on the superannuation question, much enlightening of public opinion, much spade-work on the part of the Institute, before the winter session is over. But I have great hopes, from much private information I have received, that everything will be done to overturn the present Superannuation Act, and to establish one more in accordance with Scottish prestige. In the report on the Gemeindeschulen of Berlin and Charlottenburg, recently issued by the Scotch Education Department as a blue book, Mr. G. Andrew, H.M.I., refers to the subject of superannuation. He says: "After a minimum of ten years' service the teacher is entitled to a pension of $\frac{15}{60}$ of his salary at the date of retirement, $\frac{1}{60}$ being added for each year of service after ten. The maximum pension is $\frac{45}{60}$ of his pay, forty years' service being necessary to obtain this. There is no compulsory age limit for retiring." Is it too much to expect that in Scotland pensions should at least approximate more nearly to those formerly in vogue with the old parochials? Dr. Dickie, of Kilmarnock Academy, who has done sterling work to the cause of education in that city as well as to the Institute, is retiring at the present time on a pension of £225. Had he accepted the Government scheme, I question if he would have got much over £50. Facts like these give us the data we require to show Government how miserably inadequate is the present pension scheme.

Super-annuation.

* * *

WHETHER the shelving of the present Education Bill will have any effect on Sir Henry Craik's resignation or not remains to be seen. The Scottish members of Parliament, however, taking time by the forelock, entertained him to dinner in the House of Commons in memory of his long and distinguished services to the cause of Scottish education. For thirty-five years Sir Henry Craik has worked in its service, and, as Lord Balfour of Burleigh says, it has been no dilatory or half-hearted service, but strenuous service which will long be remembered in the history of the country. There will not be a word of dissent from this testimony on the part

Sir Henry Craik.

of the teachers of Scotland. The Department over which Sir Henry presides has come in for scathing criticism on more than one occasion, but, as he says himself, he had never found more confidence in the efficiency of the Department than when it was the object of considerable and vigorous criticism. Efficiency, if it was to be the object of the Department, could not trim its sails to every shifting wind of opinion. It must have definite aims. It must endeavour to move forward and keep others moving. The services rendered by Sir Henry Craik have been very much on these lines. The aims have been definite, and the "forward policy in evidence." In not a few cases the teaching profession has considered the policy too forward, but it has not scrupled to say so. Every one recognises that the Department during the last thirty years has been ably and liberally managed. If Dr. Craik's retirement means a reversal and not a continuity of policy, it will be a thousand pities; for education is a continuous thing, and it is to be hoped that his successor in office will develop along the same lines and with the same definite aim.

DEATH has been busy among the educational giants of last generation. Among the latest is Dr. Alexander Ogilvie, late rector of Gordon's College, Aberdeen.

Dr. Alex. Ogilvie.

Dr. Ogilvie was one of six brothers, five of whom rose to eminence in the teaching profession. Four of these held the honorary degree of LL.D.—George, late head-master of George Watson's College, Edinburgh; Joseph, rector of Aberdeen Church of Scotland Training College; Robert, late Chief Inspector of Schools; and the subject of present note. Dr. Ogilvie's great work was done in connection with Gordon's College, of which he became rector in 1872. He was a man of strong force of character and a born administrator, so that in 1884 Mr. Mundella, then Minister of Education, described Gordon's College as the model of what a seminary of this kind should be. He retired in 1901, and since that date has lived in Edinburgh. In February of the present year Dr. A. Ogilvie and his brothers were entertained by the Aberdeen University Edinburgh Association. His eldest son, Mr. Frank Grant Ogilvie, is at present principal assistant secretary for technology and higher education in science and art to the Board of Education. Truly a remarkable family, and one which has left its impress on Scottish education, and has earned alike the respect and affection of generations of pupils.

THE Master of the Edinburgh Merchant Company, who has for several years taken a deep interest in the subject of commercial education, at the annual dinner of that company pleaded for a modern scheme of commercial education. He asked educationists to give assistance and advice on the subject. The term "commercial education" he took exception to on two grounds. In the first place, the term had now become practically a slang term, because it now meant a little typewriting, a little shorthand, but no education at all. In the second place, they had commercial departments in their schools which he did not think were altogether educative. Commercial and business men needed education which would really make them able to do the work of the world as it ought to be done. There were a great number of their boys, quite able to do the hard rough-and-tumble business work of the world, who left school at the present time uneducated! Modern commercial education should enable the scholars to face the problems before them, and he would like to see teachers lay aside the formulæ which afflicted most of them, and begin *de novo* to find out some system by which the boys would really be educated. He had the greatest respect for the educative value of Latin and Greek; but what they wanted was a system which would not be in opposition to the old system, but would be parallel to it, and which would enable the rising generation to become the pioneers of empire in the future.

Modern Commercial Education.

PROFESSOR CHRYSTAL referred on the same occasion to the increasing dearth of properly qualified teachers. The cause of this he thought was not far to seek. He desired to impress upon the public the necessity of paying the teachers well, so as to have the best material in the teaching profession. This has been the cry for many years in the ranks of the elementary teachers, and it is equally important in the secondary schools. The assistants of both parts of the profession have suffered for a considerable time on account of inadequate remuneration, and it is well to have Professor Chrystal reiterating the desire at such an important gathering. It had been hoped that the passing of the Education Bill would have materially contributed to this end in two ways: first by co-ordinating and unifying the various kinds of education—primary, secondary, and technical; and in the second place, by increasing the chances of promotion. For the latter point is as important as the former, and both are needed to better the professional status and emoluments. The universities could do much to educate public opinion on this question, and it is to be hoped that those in authority there will lend their voice and influence to that end.

Professor Chrystal and Teachers' Salaries.

AT the very interesting Sanitary Institute Congress, held in Glasgow recently, very great stress was laid on the importance of school hygiene. Professor Edgar, St. Andrews University, in opening the Congress made a valuable contribution to this subject. Education, he said, was beginning to profit by the fruitful labours of science. Educational thinkers were setting themselves to find out the practical bearing of scientific discovery upon the guidance of human growth. A new conception of the meaning of education and the teacher's work was taking shape. This new conception was based upon our increasing knowledge of the human organism—of the laws of its working, of the condition of its healthy life and growth—and upon the application to human life of the principle of evolution. The teacher must, indeed, have a thorough knowledge of subjects of instruction; but if he was to be an educator as well as an instructor, capable of guiding the growth of each individual pupil towards its highest social fitness, or of scientifically directing his process of adjustment, he must know in addition, and know practically and theoretically, (1) the nature of the growing organism, the child; and (2) the physical environment best suited to its health and growth. The time had now arrived when hygienic physiology or school hygiene should be recognised and demanded as part of the professional training of every teacher.

Hygiene of School Life.

THERE is one thing that I should like at this point to emphasise, and that is the great danger of overburdening the already overburdened teacher. The British Medical Association, in discussing this subject later in the month, advocated the teaching of school hygiene by medical men. They thought that medical men should give their time free for this subject. This is the right solution of the difficulty. It is not fair, it is not expedient for the teacher to take up this burden. At present he does what he can to improve the health of the children entrusted to his care, but to expect him to have the full knowledge of a medical man is carrying the matter just a little too far. Parents in many cases have resented the teacher's interference when he has made recommendations with regard to defects either of sight or of hearing. The medical faculty have the knowledge, and they could easily get the means of disseminating this knowledge among the children. Again, the large classes still in vogue militate very largely against the subject being taken up by teachers with that thoroughness which the subject merits, and without which all efforts would be rendered nugatory.

Dangers of the Subject.

THE September meeting will soon be here again. It is not expected that anything of outstanding importance will fall to be discussed. After last year's storm I expect a calm. The business for the greater part of the winter session has been taken up with the Education Bill, and now that that has fallen through, the September meeting will not likely be engaged in anything controversial. The president's address will in all probability deal with the history of the past year, but much of its spiciness will have been dissipated. The various elections that take place do not promise any contest. Since the election in June of the General Committee, one vacancy has occurred. Mr. M'Gaw, Golspie, has been appointed to an important position in Harrismith, so that his place will require to be filled up. Mr. M'Gaw has been a member of committee for seven years, and during that time he has made many friends. Not often has he spoken, but when he has done so his words have been weighty and to the point. The vacancy will be filled up by the next unsuccessful candidate, and this means, I believe, the introduction of one who has taken a very prominent part recently with reference to the start of a widows' fund. On account of the lack of time for adequate discussion of the purely domestic policy of the Institute, an innovation is this year to be made. The conferring of the honorary degrees is to be made at the Congress at Christmas week. This may help to lighten the forenoon sederunt, and give more time for business proper. R. G.

E.I.S. Doings.

THE 1906 CERTIFICATE SYLLABUS.

SIR,—The enclosed letter which we have received from the Board of Education makes clear a point in the 1906 Certificate Syllabus. The work prescribed from the *Golden Treasury of Songs and Lyrics* forms but a part of that required for the 1905 Certificate Examination.

(*Extract.*)

"I am directed to state that the book to which you refer is Book II. of the original edition of the *Golden Treasury*—that is, the book containing selections from the seventeenth century lyrics."

Candidates for 1905 must study the whole of the *First Series*—that is, the original compilation. Candidates for 1906 will study from the same book (the *First Series*), but Book II. only of this. P. LYDDON ROBERTS AND E. E. DENNY.

THE NORMAL CORRESPONDENCE COLLEGE.

TEACHERS WHO HAVE WON THEIR SPURS.

TWO distinguished men, Sir Daniel Morris, K.C.M.G. (1903), Imperial Commissioner of Agriculture for the West Indies and British Guiana, and Sir T. Marchant Williams, Kt. (1904), Stipendiary Magistrate for Merthyr Tydfil and Aberdare districts, are ex-certificated teachers on whom King Edward the Seventh has conferred the honour of knighthood. Both are sons of gallant little Wales, who, by ability of a high order and untiring energy, have made their mark with those most effective weapons of peace, the living voice and the pen of the ready writer. They have set noble examples, each in his own way, abroad and at home, of what strenuous devotion to duty may do when directed upon congenial work, and have shown how it is possible for a schoolmaster not only to rise through his profession, but to be able by the experiences of that profession the better to serve his country in positions of even higher influence.

SIR DANIEL MORRIS, K.C.M.G.

Sir Daniel Morris has just returned from Barbados for a well-earned holiday, after six continuous years of toil and travel in tropical America. He was the principal guest at a dinner given in London on June 22nd by the West Indian Club, and next day he lectured, before the members of the club, merchants, and officials of the Colonial Office, on the work of the Commission.

A short sketch of his career will be welcome to those teachers who remember his genial comradeship among them at Cheltenham, Worcester, and Burnley, and by those who, as students of geography, are interested in the development of various parts of the enormous areas of Britain's "back garden."

Sir Daniel Morris is a native of South Wales, and learnt the principles of teaching at Swansea Schools

and St. Paul's College, Cheltenham. As a schoolmaster at Worcester he found congenial work in preparing his pupils for the South Kensington Science and Art Examinations in botany, drawing, and other subjects necessary for their due preparation for and advancement in the renowned Worcester china works. He became a pupil under Professor Huxley at the Royal College of Science, and a student of Trinity College, Dublin, where he took first class honours in natural science, was gold medallist, and proceeded to the degree of D.Sc. Later he was selected by the late Sir James Kay-Shuttleworth for the post of science master at the Burnley Grammar School, and of University Extension Lecturer.

In 1877, on the recommendation of Sir Joseph Hooker, Dr. Morris became assistant-director of the Royal Botanic Gardens, Ceylon, and was publicly thanked and received a handsome honorarium for his investigations into the nature of the coffee-leaf disease. He showed himself to be a botanist of rare powers of observation, and to possess that ability to organise men which especially marks British successful colonial endeavour. His sympathy with boy life quickly converted the native school children in the neighbourhood of the Peradeniya gardens into ardent collectors of specimens of the profuse fauna and flora of the lovely island.

In 1879 he was sent by Sir Michael Hicks-Beach to Jamaica, as director of the Botanic Department there; and living among the Blue Mountains, he undertook the task of classifying the local flora. A handsome agave of variegated colours in one of the tropical houses at Kew Gardens bears his name (*Agave Morrisii*), which Sir Joseph Hooker conferred upon it in honour of the discoverer of the hitherto unknown variety. In 1882 he explored British Honduras, and in the following year reported on the resources of the island of St. Helena.

In 1886 he was selected by the late Lord Iddesleigh, then First Lord of the Treasury, for the Crown appointment of assistant-director of the Royal Gardens at Kew under Sir W. Thistleton-Dyer. A special botanical mission took him to the West Indies in 1890–91, and he visited the Bahamas in 1895. In 1896–7 he made an extended tour of the West Indies, as scientific adviser to the Royal Commission appointed at the suggestion of Mr. Chamberlain, Secretary of State for the Colonies. His separate report on the agricultural resources of the West Indies is held to be of special value, and when the Imperial Department of Agriculture was formed for the West Indies and British Guiana in 1898, Dr. Daniel Morris was appointed Commissioner.

The objects of the Royal Commission were to inquire into the agricultural depression of the West Indies, how far it might be due to local circumstances and accidents of insect pests, climate—droughts and hurricanes—and volcanic disasters, to lack of best methods of cane cultivation and sugar manufacture, and to the unfair competition of European countries which supported the exportation of beet sugar by payment of bounties to the exporters. A grant of £17,420 was made by the British Parliament towards the relief of the distress in these sugar-growing colonies.

The Commissioner established his head office at Barbados, the central point for mail communication with the islands and with England, and during the past six years he has organised and carried out, with able assistants, the administration of the grant and every possible effort for agricultural improvement. In this arduous task his guiding principle has been that the West Indies are not played out, but that the colonists must be led to strenuous efforts to help themselves under the stimulus of the best scientific advice that can be given. Naturally he was told that a mere scientist could not teach planters who were following some two centuries of accumulated local experience; but when the educated planters saw what was actually done on the experimental plots in increasing the percentage of sugar per acre by careful selection of the best sorts of canes, by judicious choice of manures and improved methods and implements of culture and manufacture, they became experimenters themselves, gladly sought information and direction, and at the present time most of the experimental work is done on the plantations by private enterprise, encouraged and advised by the Department of Agriculture.

A maxim which the Commissioner is never tired of instilling takes the form of the easily-remembered homely proverb, "Never put all your eggs into one basket when you are going to market." Though the planters prefer to grow and make cane sugar, in which their capital is invested and to which their labourers are accustomed, they have been enabled to see that crops in variety are far less likely than a single cultivation to fall a prey to devastation by chances of drought, hurricane, and plant diseases. Sir D. Morris's visit to the Atlantic North American states last year resulted in the recognition of the finest cotton in the world as a second crop for the West Indies, and next year will see 8,000 acres under sea-island cotton, calculated to yield 1s. 4d. per pound in Manchester. A call at Bermuda on the way back brought the discovery that those small islets have in one year sent £84,000 worth of onions to the New York market. Antigua and other portions of the West Indies are turning this information to profit, growing onions on the hitherto unused cane banks. The main industries of the West Indies now include sugar, cotton, cacao, rice, bananas, oranges, limes, Jamaica pepper, vanilla, ginger, nutmegs, English potatoes, pines, and cocoa-nuts; these and many others have received direct encouragement from the Department of Agriculture.

As to labour, the negro is less easy to move along new paths than the Briton, and with both Sir D. Morris believes in catching the worker in his early days. Agriculture is taught in the elementary schools—practically as far as possible, with gardening in pots, boxes, and school plots. A printing press at Barbados disseminates the *Agricultural News* throughout the colonies, containing hints as to growing, utilising, and marketing products. A fine display of West Indian fruits was made last month at the Royal Botanic Society's Gardens in London. The West Indian Club gave a dinner, where Sir Daniel Morris was the chief guest, and he received compliments on every hand upon the success of his work in the West Indies. Sir Daniel is a Fellow of the Linnæan Society of London, of the Royal Horticultural Society, of which he formerly was treasurer, and a recipient of its "Victoria Medal of Honour." He is also a Fellow of the Royal Colonial Institute, and of other societies specially interested in questions affecting the empire. He lately received the degree of D.C.L. (*honoris causa*) from the University of Durham. Finally, Sir Daniel is the author of numerous scientific works and publications relating to tropical agriculture, but with special reference to the conditions existing in the West Indies.

Sir Marchant Williams has been with us all the time, and he is well and kindly remembered by the

older teachers of London as Inspector of Board Schools, and by the Welsh residents of the metropolis for his strong nationalist sympathies and hearty co-operation in good works among them, while throughout the Principality he is known and honoured as a sound and able lawyer, a forcible speaker, an enthusiastic nationalist, and a sympathetic gentleman. A splendid dinner was given to Sir Marchant Williams at Cardiff. There were present some of the leading people of South Wales; and the occasion was a very remarkable one, for it is very seldom that so high a compliment is paid to any one in that part of the country. "Sir Marchant must be a very striking and attractive personality to evoke so much enthusiasm."

Mr. Marchant Williams was apprenticed to the late Dan Isaac Davies at Aberdare British Schools, and the intense Celtic national feeling which marks his career may be largely attributed to the influence of Mr. John

Sir T. Marchant Williams, Kt.

Phillips (Principal of Bangor Training College), in 1864–5, and Sir Hugh Owen. Becoming master of Amlwch British School, he returned to Bangor as head-master of the Practising School, lecturer on method, and junior tutor in 1871. He graduated B.A. with honours in London University, and was appointed Inspector of Schools by the London School Board. For ten years he fulfilled the duties of the inspectorate to the satisfaction of the educational authorities and the teachers, and contrived to find time to take active part in the various national and philanthropic efforts in London, as well as to fulfil his terms as a student of law at the Inner Temple.

He was called to the bar in 1885, and the same year he returned to Wales, where he practised on the South Wales circuit. As a barrister and skilled expert in questions of elementary education he has done excellent service for teachers in Wales, where he was standing counsel for the National Union of Teachers. He has been assistant Charity Commissioner, entrusted with important inquiries into the charities of the counties of Carmarthen and Monmouth. Since 1890 he has been stipendiary magistrate for the Merthyr and Aberdare districts.

Of the national movements which Sir Marchant Williams has either initiated or assisted in founding may be mentioned the North Wales University, of which he is treasurer of the Guild of Graduates; the North Wales University College of Bangor, where he was hon. secretary till the charter was drafted and the educational staff appointed; and the National Eisteddfod Association. Sir Marchant Williams is a member of the Court of Governors of Bangor and Cardiff University Colleges, and on the nomination of the Duke of Devonshire he succeeded the Earl of Powis as a representative of the Lord President of the Council of the University Court.

PHYSICAL TRAINING AS A BRANCH OF SCHOOL HYGIENE.

BY H. RIPPON-SEYMOUR,

Chief Instructor, George Watson's College, Edinburgh; Member International Congress on Physical Education, Paris, 1900, etc.

THE recent Committee on the Model Course of Physical Exercises make the following statements:—

"The question of physical training can only be looked upon as a branch of the greater question of school hygiene;" and, "The primary object of any course of physical exercises in schools is to maintain, and if possible improve, the health and physique of the children."

These statements are of great importance, and show that the educational authorities are keenly cognisant of the necessity of physical training as a regular part of the school life and work of the children.

As is now well known and generally admitted, physical training has a distinct influence from an educational point of view; but I wish rather to deal with, not so much its educational effect as its effect on the health and physique of the children, which I might term its physical effect.

A system of exercises designed to produce a correct physical effect should have three distinct aims in view:—

1. To raise the general standard of health, and increase the power of resistance to the organisms of disease.

2. To aid the development of the child in structure and function.

3. To assist in the treatment of distinctly pathological conditions.

It is surely not too much to expect that every teacher should have a very fair knowledge of the means by which the aims set forth in numbers one and two may be gained, and that every professional teacher of physical training should have a thorough knowledge of all three; but, unfortunately, this is rarely the case.

Before considering the type of exercise which will attain the first of our "aims," we may first briefly consider how exercise affects the general nutrition of the body.

The immediate result of muscular contraction is to raise the blood pressure, and in consequence to increase the exudation of the lymph (which is merely food in an assimilative form) into the general tissues of the body.

In the actual muscle itself there is an effusion of lymph not only whilst contracted, but also immediately after contraction has ceased.

It has been recently demonstrated that a muscular contraction of sixty seconds' duration produces an effusion of lymph which is absorbed in sixty seconds; and another effusion takes place on the completion of contraction, which is as quickly absorbed. So that a period of exercise lasting one minute produces really a four minutes' effect; and, further, this effect, which is rightly called "nutritive," is enhanced by the pressure in other lymphatic vessels (perhaps remotely situated from the actual muscles being contracted), which aids the flow of lymph along these vessels also.

Muscular exercise, therefore, maintains a high level of lymph exudation; the lymph spaces of the tissues are filled with food and oxygen, and a corresponding removal of waste tissue takes place.

The principle on which the exercises designed to attain our first aim should be based is that rapid, short muscular exercise stimulates the fluid exchange between the blood and the lymph spaces, and is truly "nutritive" in that it nourishes and "builds up" the body.

We have seen that to get the physiological value of these exercises, they need only be of sixty seconds' *duration*, while producing a four minutes' *result;* hence their great value and general applicability, in more than one respect.

Firstly, they can be used on healthy and feeble alike; secondly, a very short time is necessary for their execution—one or two minutes' short, sharp exercise three or four times during the day being all that is absolutely necessary to attain our *first* object.

This, then, may be attained (as in Sweden) by turning the children out into the playground, if fine, a few minutes every hour; and when there, to see that they engage in such exercises as skipping, jumping, running games, etc.—in fact, any coarse muscular movements, so long as they are done with moderate regularity, and every hour if possible. If wet, the children may stand up within the desks and perform some simple movements with vigour, and practically the same effect is produced. Precision of movement and correctness of position are here of no particular value—in fact, it would be quite against the physiological principle of the exercise to stop it and correct faults. Therefore the ability of the teacher need be only of a most elementary kind; he has simply to see that each child is actually engaged in the work, whether its performance is technically right or wrong.

Another type of exercises, the respiratory or deep breathing, are quite legitimately classed as "nutritive." They greatly assist in the general nutrition of the body—(1) by bringing an increased supply of oxygen to the blood; (2) by removing carbonic acid gas from the lungs; (3) they develop the air-cells in ordinary use in the lungs; and (4) they cause a forced and quicker inspiration, which reaches air-cells not brought into play during ordinary respiration.

These exercises are, therefore, a very important factor in keeping up the nutrition of the lungs; and further, their effect on the circulation is very important, as they improve the tone of the heart muscle, and improved heart muscle means greater blood pressure, which, as we have seen, produces increased fluid exchange between the blood, the lymph, and the tissues.

Deep-breathing exercises should consist of long, deep inspirations, followed after a very slight pause by prolonged expiration—both movements being performed through the nose only.

The teacher must proceed gradually, and not expect to get the fullest respiratory movement possible at once, but instruct the children to gradually prolong the acts of inspiration and expiration from day to day. When young children have learned to respire properly, the movements may be accompanied by such arm movements as tend to intensify the respiratory acts, but not before. When possible, these breathing exercises should be performed at least three times daily, and in the open air; but if the weather prevent this, the classroom windows should be widely opened. During the performance of breathing exercises, the teacher should endeavour to discover whether any of the children are unable to breathe properly through the nose. Many young children cannot do this simply from want of practice, but others, again, are unable owing to some disease, such as adenoids. When such a case is discovered, it should be at once reported, either to the school medical officer, if there be such, or through the head-master to the child's parents, as much may be done to rectify matters if they are taken in time.

Our second aim was stated to be "the development of the child in structure and function." The exercises for this purpose are of an entirely different character from those described as "nutritive." In this case an "educational" effect must be combined with the "physical." Great accuracy and precision of movement are here necessary, as well as development of muscle; and, in fact (especially in children), the mere development of masses of muscle should not be the ideal of either teacher or pupil. The aim should be rather to produce an even muscular development, so that the various groups of muscle may co-operate one with another, acting in perfect harmony, and, in consequence, making the various actions of body, arms, and legs prompt, easy, graceful—in fact, *natural*, in the best sense of the word.

The exercises of this type, though simple at first, require to be numerous. They must gradually advance in complexity, so that—almost imperceptibly—harmony of movement may be realised. Each part of the body must be exercised according to its natural function, and the muscular effort necessary must be well within the power of the weakest member of the class. Muscular development exercises requiring accuracy have also a powerful influence on brain development. At least one-third of the brain is given up to the motor areas, and each area has directly under its control certain groups of muscle. We know that muscular exercise is necessary for the full development of these nerve centres, for it has been proved, on examination of the brain, that in cases where a limb has been lost early in life (or for any considerable period of life) its corresponding motor area is but feebly developed.

The instruction to attain this, our second aim in physical training, must be carried out as an "educational lesson," each lesson lasting about twenty or thirty minutes, and repeated, say, three times weekly. In no branch of school work is able instruction more essential, and yet more often than not lacking. At the present time the class teacher usually undergoes a short course of instruction in physical exercises, which is generally inadequate to do more than give a moderate and elementary knowledge of the practical part of the subject. As a rule, no serious attempt is made to present the subject to classes of teachers from its physiological

aspect. In all teachers' training colleges school hygiene in all its branches is entitled to a place in the curriculum; and physical training, to be of any real use, must include instruction in the physiology of exercise as well as in merely practical work. Unfortunately, many of the physical training teachers, commonly known as "gymnastic instructors," are themselves deficient in the fundamental physiological principles of the subject they profess. They are replete with any number of exercises of various complexity and difficulty—too often, however, a knowledge not only valueless, but harmful, if applied without a scientific basis. In the future, perhaps, this branch of school work will be put in the hands of those able to appreciate it from a higher standpoint, and not left to the tender mercies of the old soldier and janitor.

The third aim, "to assist in the treatment of distinctly pathological conditions," is one that has never yet, in this country at all events, received the attention to which it is justly entitled. In every school there is a certain percentage of children who, from some physical defect, are unable or unwilling to take part in the games of the playground. They may always be seen moping in corners during play-time; and when physical instruction is being given and their fellows are improving their health, these unfortunates, who are mostly in need of such physical improvement, are perhaps given some mental task *to keep them out of mischief*.

If physical training by means of muscular exercise is looked upon as essential for the average healthy child, it is infinitely more so for those suffering from some bodily defect, who are, in greater or less degree, excluded from participation in the natural games of childhood.

The practical question, therefore, regarding these children is, What are we to do for them? Are they, suffering from some bodily defect (it matters not here from what), to be left in their deformity, without some attempt to improve their condition by means of remedial physical training? The new Code suggests that such children be desired only to perform such of the class exercises as they can; but the better way would be to place such children in a class (or classes) by themselves, under a specially qualified instructor, each case being treated as far as possible individually.

Without in any way claiming that physical training is a panacea for all the evils that child life is heir to, there is no doubt that it is daily becoming more recognised by the medical profession as a distinct remedial measure. Medical men are now specialising in this branch of therapeutics, which has proved itself to be of great value and wide applicability in cases where neither surgery nor medicine would be of any use.

In order, however, that this special physical training may be of real value, it must be placed under medical supervision. Each school should have a room, fitted with the necessary apparatus, set apart for the special treatment of these cases. By this means many of these "defectives" may, in the early stages, be completely cured, while the more advanced cases may be greatly benefited and given the opportunity of becoming useful citizens.

In the larger centres of population, at least, there should be no difficulty in carrying out such an arrangement as is here suggested; whilst as regards rural schools, though there are difficulties, fortunately the numbers of defective children are not so large as in the densely populated centres.

I cannot mention here the type of exercises necessary to attain this the third aim in physical training. No definite system can be laid down; each case must be taken and treated according to its special requirements by an expert. Any highly qualified instructor (or instructress) should, under medical supervision, be capable of undertaking the medical gymnastic training of pupils requiring it: it would not be reasonable to expect the class teacher to know this work in addition to his other work.

In conclusion, a few words on dress may well come within the scope of this article.

The question of suitable clothing should not present any great difficulty. Boys ought to take off jacket and waistcoat, and loosen the shirt collar. If possible, a cricket belt, not over tight, would be an advantage. As it is quite useless attempting exercises for the foot in heavy school boots, these ought to be replaced with ordinary gymnastic shoes. The importance of these latter exercises in developing the arch of the foot, and thereby counteracting "flat-foot," is very great; for it must be remembered that this is a condition which excludes from every public service.

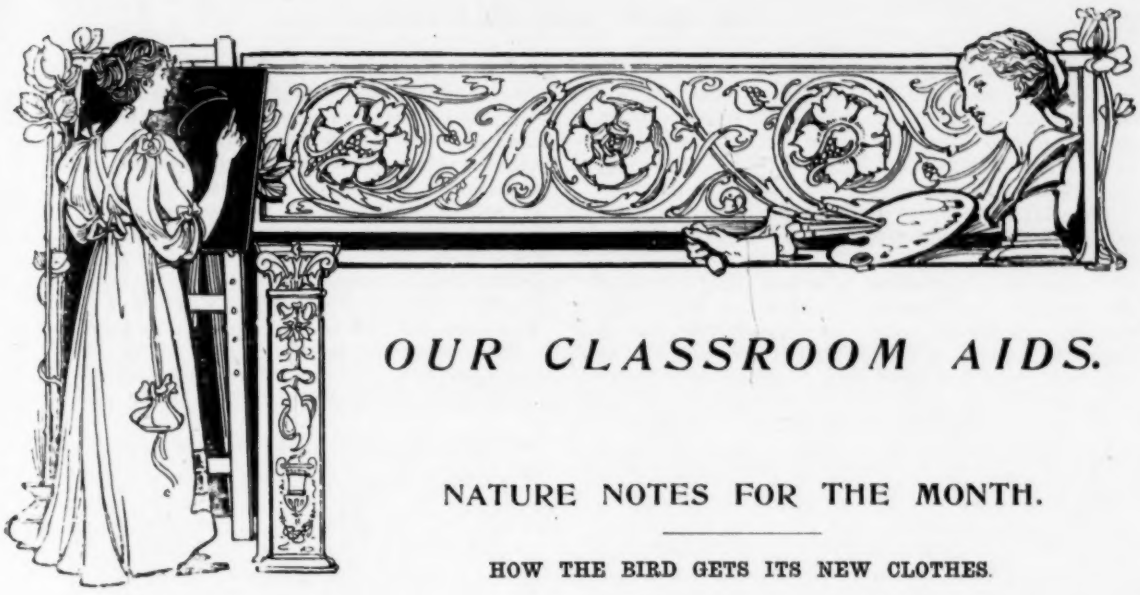
Gymnastic shoes are just as necessary for girls. A simple school costume, almost a uniform (as regards design, that is to say), such as is worn in Sweden, and consisting of loose, easy-fitting blouse, knickers, and skirt, might be gradually introduced into all schools. Corsets (the old story) should never be allowed, so as to ensure free play of the trunk muscles, and strengthen the back by *natural* means. During the lesson in physical training the skirt might be removed, but if reasonably short this is not absolutely necessary. A dress of this description admits of complete freedom of movement, and consequently the value of the training becomes practically doubled.

There are, of course, other branches of school hygiene, which, however, scarcely come within my province here—such as ventilation, sanitary arrangements, playground space, etc.—but in which, happily, a great advance has been made during the last few years. In fact, it is no exaggeration to say that these branches of school hygiene have hitherto made greater strides than that branch which has been the subject of my article.

To meet the requirements of schools, both as to cost and otherwise, the first volume of Professor G. G. Ramsay's *Latin Prose Composition* will be published immediately by the Oxford University Press in three small volumes. The first part will contain the earlier exercises, the second will form a second year's course, and the third will consist of syntax and an appendix. Considerable additions have been made to Parts I. and II., new passages for translation into Latin prose being given.

Assistant Teachers in French Lycées.—The Board of Education have received from the French Government a notification of their intention to attach as temporary assistants to certain *lycées* a number of young English secondary schoolmasters, or intending schoolmasters, who have undergone an approved course of training and hold some recognised diploma for secondary teachers. These assistants will not take any share in the regular work of the school, but will conduct small conversation groups under the direction of the *proviseur*. Two hours' work a day will be expected of them. The rest of their time will be at the disposal of the assistants, who will thus be able to pursue their own studies. The assistants will receive no remuneration, but will be boarded and lodged at the institutions to which they are attached.

Candidates for such posts should forward their application to the Director of Special Inquiries and Reports, St. Stephen's House, Cannon Row, S.W., enclosing testimonials as to character, capacity, and teaching experience, and a medical certificate of health. It will also be necessary for each candidate to have a personal interview with the Director at his office, and should any candidate have any special desire as to date of interview, it would be well to indicate it when forwarding the application.



OUR CLASSROOM AIDS.

NATURE NOTES FOR THE MONTH.

HOW THE BIRD GETS ITS NEW CLOTHES.

Introductory.

PRACTICALLY speaking, the whole of our native birds finish their housekeeping duties by the end of August. Of course, there are exceptions to every general rule. In walking along by the thick hedgerows, the field naturalist may hear the chirping purr which denotes the vicinity of a wool-lined nest, brimming over with its burden of semi-fledged greenfinches; or the tremulous squeakings of a pair of downy young wood-pigeons, being fed by their parents in the fir trees hard by; but the greenfinch and the wood-pigeon are notoriously late breeders. To the majority of birds autumn comes as a welcome period of well-earned leisure, wherein the heavily-taxed constitution may have opportunity to recuperate in order to withstand the vicissitudes of coming winter.

Why the Bird Needs New Clothes.

One of the bird's greatest requirements is a new coat of feathers. Four months' hard outdoor work, incidental on the upbringing of some dozen or more healthy offspring, has tended to impart a frayed and weather-beaten appearance to our friend's plumage, which looked so smart at the commencement of the breeding season.

It is patchy, too, in places, owing to the accidental loss of sundry feathers; and these little openings in the clothing, though of no great consequence in the heat of a summer day, will prove sadly inconvenient when penetrating winter returns.

Apart from the fact of mere shabbiness, there is the more serious consideration of the wear and tear of the flight feathers to be taken into account. The wings are used so frequently in the course of the daily routine, that it would be curious indeed if continual hard usage and contact with branches, etc., did not damage the quills to some extent. Flight is essential to a bird's existence. Damaged or broken wing quills detract from the powers of flight; hence at certain times it becomes absolutely necessary that these small but important parts of the flying apparatus be renewed.

How it Gets them.

The assumption of new feathers in place of the old is familiarly known as the "moult." In explaining how this interesting process takes place, it may be necessary, for the benefit of new readers, to briefly recapitulate a few of the points of an article on "feather growth" which appeared in the June *Practical Teacher*.

Each feather springs from a follicle, or fold, in the outer skin, situated at the bottom of which are a group of active little cells.

When the bird's coat needs renewing, the building cells set to work, and proceed to construct the tip of a new feather immediately beneath the base of the old.

As a consequence of this arrangement, when the newcomer begins to increase in length, it pushes against the base of its predecessor, and ultimately ejects it completely from the follicle.

After having freed itself in this unceremonious fashion, the usurper lengthens rapidly, and mingles with its fellows of earlier date; but for some time after its emergence it is readily distinguished from the others by its quill-like appearance, which is the result of a tight-fitting transparent skin which binds the whole structure into a compact pale-blue cylinder. As described in previous notes, the subsequent disintegration of this skin covering transforms the unattractive spine into a beautiful feather.

The old feathers are not cast simultaneously from every part of the body. If they were, the creature would be in a condition of naked helplessness during the period that must necessarily elapse between the shedding of the old and the complete growth of the new plume.

The process takes place in gradual stages, a few feathers at a time, so that the plumage during the season in question is generally a quaint mixture of old and new. However, patchy though the coat may be, it is still complete enough to be of service to its owner.

The Renewal of the Flying Apparatus.

In the renewal of the flight feathers we have another example of the methodical manner in which Nature works for the benefit of her children. The wing quills are shed in pairs, one individual falling from each wing. The curious part of the matter is that, after one pair has been shed, no further casting takes place until the resulting gap in each wing has been filled by a new growth.

With the exercise of a little thought, it is easy to see that the wing is at no time deficient in more than one flight feather, which deficiency does not seriously handicap the bird in its flying powers. Birds, such as the swallow and others, which practically live on the wing, should appreciate the wisdom of this arrangement.

The wild duck is not so fortunate, for all the wing quills fall out simultaneously when it moults. Until the new flight feathers are long and rigid enough to be of service, the unlucky duck is at the mercy of numerous enemies; but being an aquatic bird, it gets over the difficulty to some extent by keeping strictly to the water, or skulking in the herbage at the sides. If the duck were purely a land bird, it would soon be exterminated.

Duration of the Moult.

With the average resident bird the moult begins shortly after the adult has been released from parental responsibilities. As most bird-keepers are aware, it is an extremely tedious operation, and, moreover, one which is fraught with considerable danger to the individual chiefly concerned. The duration of the moult undoubtedly varies according to the bird's physical condition. Good health, by promoting the vigorous growth of the new plumes, has the effect of accelerating the shedding of the old; but if the bird be at all weakly, the process is liable to be protracted through three or even four months. This is often the case in regard to cage birds. Draughts, improper food, and sudden shocks to the nervous system, all contribute to check progress, and bring about that undesirable condition quaintly known in the fancy as "stuck in the moult."

The favourable surroundings of the wild bird must needs have a beneficial effect. Unfortunately, it is not easy to gather reliable statistics, owing to the difficulty experienced in keeping certain individual birds under continuous observation; but in looking over my last year's notes, I am led to believe that the process is completed in six weeks, or perhaps less. One item in particular is significant. On August 6th four starlings were procured. Three were birds of the current year, still clad in the ashy garb of infancy, save at the sides of the breast and a few places on the wing coverts, where the dark adult feathers were just appearing. The fourth was an adult female; it had completely finished the moult, and was covered with the buff-tipped feathers which give the starling its characteristi speckled appearance in winter. Assuming that the bird dispatched its second and last brood in the third week in June (the usual period), it is reasonable to assert that the moulting process had been completed in six weeks or less.

Summer and Winter Plumage.

After finishing the moult, the bird is said to be clad in winter plumage. Why *winter* plumage? one might naturally ask; for does not the new coat have to serve a twelvemonth, which implies that summer also is included?

The explanation of this seemingly paradoxical statement is best conveyed by taking an incident in the life of one of the commonest birds, the starling. When decked out in new finery, the male's coat is a beautiful glossy black, plentifully besprinkled with pale-brown spots. This, in conjunction with a dark-brown beak, constitutes "winter plumage." In the following spring, when the bird is naturally desirous of attracting the attention of the opposite sex, it appears in a different guise. The beak is now a pale sulphur yellow. The glossy black is present still, shining with metallic tints of purple and green; but all the tiny starlike spots have disappeared, so that a casual observer might easily assume that the bird had gained a new coat by the process of another moult. As a matter of fact, there has been no further moult, for the feathers that are *apparently* different are identically the same ones which were assumed in the previous autumn. The change has been brought about by the shedding of the extreme *tips* of the feathers, as represented by the buff spots.

I mention the above circumstance because the spring change is often mistaken for a moult. A moult is the shedding of the *entire* feather. The assumption of spring plumage is the shedding of the *tips* of the feathers.

Why the Moult takes place in Autumn.

Working on the fact that the moult is a critical period in a bird's life, there are several good reasons why autumn should be specified as the moulting period.

In the first place, the breeding season is over, and there are no nesting cares to worry and sap the vitality when it is most needed. The weather also is favourable, as a rule, and temperature is mild, so that the resources of the patchy and incomplete coat are not too heavily taxed.

Foremost of all, however, autumn is the time of plenty, when Nature is distributing her bounties with a generosity that is never equalled at any other time of the year. Insectivorous birds find fat flies and caterpillars on every hand, ready waiting to be snapped up; and when this diet palls, there are the resources of the orchard to fall back upon. Seed-eaters, such as the finches and pigeons, have simply to alight on the nearest cornfield, and regale themselves to their hearts' content, with the minimum of exertion.

With such advantages, who can wonder that the wild birds perform their moult so easily! Yes, autumn is undoubtedly the moulting season.

NOTES OF LESSON ON GAME: ITS FRIENDS AND ITS FOES.

Class.—These lessons are suitable for children in Standards V. and VI., of either urban or rural schools.

Time.—Two lessons of thirty minutes each.

Object.—In the case of the children of rural schools these lessons should help them to regard game as they do other living creatures—things of life and beauty to be loved and tended, and not as so many "head of game," bred up merely to swell the bag at a big battue. More good may be done in this way by instilling a love of the creatures themselves than by discussing the ethics of shooting game. Much ignorance is shown even by country people as to which animals are destructive and which useful; the average keeper is slow to receive new impressions, and is quite content to follow the traditions handed down by his forefathers on the subject. Nature study, by training the powers of observation, will doubtless bring about an improvement in this respect, and those animals will be spared which, if they do sometimes do a little harm, more than counterbalance this by the good they do. To town children who have no opportunity of becoming acquainted with country life these lessons will serve to widen their mental horizon.

Step I. Preparation.—The first step will be to ascertain the extent of the children's knowledge of the subject. In the case of boys in the country this will probably be sufficient to warrant a few words from the teacher on the subject of trespassing and such like boyish offences. For town children much can be done by means of the many beautiful coloured pictures that are published. The children should always be allowed to examine and comment on these beforehand, in order that they may exercise their own powers of observation.

Step II. Presentation. *Game.*—Under this title are included those animals and birds that are reared for sport and the chase, such as hares, pheasants, partridges, grouse, black game, and bustards; this distinguishes game from poultry, which is reared simply as an article of food.

Kinds of Game.—1. The *common hare* is from twenty-four to twenty-seven inches in length. Its form is well known, the most characteristic features being its long ears, its deeply-cleft upper lip, and the great length of the hind legs compared with the fore legs. Like all other animals of its class, it is furnished with sharp incisor or cutting teeth, the front sides of which are composed of harder material than the back, the result being that as the teeth are used the back parts wear away more rapidly than the front, leaving sharp, chisel-like edges. The colour of the fur is a dull reddish brown, and is distinctly protective, harmonising admirably with its surroundings. In winter the coat is lighter than in summer, and in the far north the Russian hare affords a striking example of protective coloration, as its coat turns pure white when the snow begins to lie on the ground. Hares pass the day on their "form"—a slight hollow in the earth or the grass—but as evening comes on they may be seen coming out to feed on the green vegetation.

2. *The pheasant* is an exceedingly handsome bird; its total length is nearly three feet, of which the tail occupies rather more than half. The feathers of the head and neck are steel blue, and glisten in the light with a metallic reflection; the body is yellowish brown with dark markings, but the hen is not nearly so brilliant as her mate. In order to secure a good supply of birds, many eggs are hatched under hens, or in incubators, the young ones being fed on ants' "eggs"—really the pupæ—and as they grow larger, on corn and green food to which meat, raisins, and potatoes are added. When turned out to look after themselves, pheasants feed on berries, grain, seed, and insects.

3. *The partridge* is much smaller than the pheasant, being only about twelve inches in length; its plumage, too, is much less brilliant, being a sombre brown with dark markings; the breast is lighter than the back, and that of the cock bird generally bears a reddish brown horse-shoe or crescent-shaped mark. Unlike the pheasant, the partridge is seldom found in woodlands, preferring open and cultivated country, where it feeds on grain, seeds, and insects; large numbers are reared by hand. The nest is usually a slight hollow in the ground, and both birds will endeavour to draw off any stranger that wanders too close to the nest much in the same way that the plover or the lapwing does.

4. *The grouse* are found chiefly on the moors of Scotland and the north of England. They somewhat resemble the partridge in appearance, but are easily distinguished by their legs, which are feathered right down to the toes. The plumage is of a brownish colour, with white and black markings; this coloration is decidedly protective, and the shade of brown varies very considerably according to the surroundings amidst which the grouse live. The food consists of berries, seeds, leaves, and heather tips, the last named giving the grouse its particularly distinctive flavour.

The Friends of the Game.—The Government has always taken upon itself the task of protecting game, not, however, out of any particular affection for the animals themselves, but in the interests of the game-owners. Still, however, the birds may be thankful that they are allowed a "close time" during which to hatch their eggs and rear their young ones. During the "close time" no birds may be killed, and it is also interesting to note, as a survival of the old Puritan times, that it "is unlawful to kill pheasants, partridges, grouse, or hares on Sunday or Christmas Day." The following are the times of the close seasons: Partridges, February 1 to August 31; pheasants, February 1 to September 30; grouse, December 11 to August 11. There is no close time for hares, but the sale of hares and leverets is prohibited between March and July, and this is generally regarded as a close time.

The Enemies of the Game.—A visit to a gamekeeper's "museum" will show that he ruthlessly destroys everything that shows the least likelihood of injuring the game; in fact, this habit of indiscriminate destruction has led to the almost total extinction of many birds of prey which were not only beautiful in themselves, but also, far from being injurious, were serviceable in destroying other foes to the game more destructive than themselves. Kestrels, hobbies, and merlins are all ruthlessly destroyed by the keepers; and although they must plead guilty to an occasional young partridge, this is amply paid for by the number of rats they consume, for the latter are terribly destructive to the eggs and young birds. The owl often falls a victim to the keeper's gun; but a little observation will show the folly of this. The owl, in common with other rapacious birds, casts up the indigestible portions of its victims in the form of hard oblong pellets, and an examination of these "castings" will show that the diet of the owl consists of mice with an occasional small bird. Putting the number of mice consumed by an owl at five per night, which is a very moderate estimate, it will be seen that a pair of owls will benefit the farmer by destroying 3,650 of these destructive little creatures per annum.

The sparrow-hawk is a terrible foe to the young birds, and, alas, has no counterbalancing good qualities to plead. It will glide swiftly round a hedgerow and seize a young partridge before the astonished old birds have time to realise what has happened or to raise a note of alarm. Yet to those who have no game to preserve the sparrow-hawk is an interesting bird to watch. A plantation of young oaks is a very likely place to find a sparrow-hawk's nest, which is built of twigs, and almost flat; and close by the watcher may see the bird himself sitting bolt upright on one leg with his bright yellow eyes glancing in all directions, but on the slightest sound he glides like a flash into the thicket.

Crows, magpies, stoats, and rats cause terrible havoc among the young birds. The two former will search the hedgerow for eggs, and are ever ready to pounce down on a young pheasant straying a little way from the coops, or a young partridge not under the immediate protection of the parent bird. The stoat or the weasel can be easily brought out into the open, for their presence is generally announced by an unusual flutter among

the small birds; then all the observer has to do is to make a squeaking noise with his mouth like the squeak of a rat or a young rabbit, and generally the stoat or the weasel will come trotting out in the direction of the noise, peering about for its victim. When it discovers its mistake it vanishes in an instant, and no amount of squeaking will cause it to reappear.

Step III. Association.—As the lesson proceeds, the particular object under consideration will be compared with other animals with which the children are familiar, and the points of likeness and difference brought out, and whenever possible the suitability of structure to habits shown. Thus the hare and the rabbit may be compared, and it will be seen that the latter is smaller, more gray in colour, its ears are not tipped with black, and that its hind legs are not so much longer than the fore legs. In habits, too, they differ—the hare lying on a "form," while the rabbit burrows in the ground.

Step IV. Formulation. 1. *Game.*—Those animals bred for sport.

2. *Kinds of Game.*—Hares, pheasants, partridges, grouse, etc.

(*a*) Hares. Long, black-tipped ears, cleft lip, long hind legs; colour reddish brown (protective); lies in a "form."

(*b*) Pheasants. Handsome, with long tail; steely blue head and neck, and brown body with dark markings.

(*c*) Partridges. Smaller than pheasants; duller brown in colour; fond of open ground; build their nests on the ground.

(*d*) Grouse. Very much like the partridge; legs feathered all the way down to the feet; colour varies with surroundings.

3. *Friends of Game.*—Parliament has ordered close time to enable the birds to rear their young ones.

4. *Enemies of the Game.*—Sparrow-hawks, crows, magpies, rats, stoats, and weasels are very destructive to young game. Kestrels, hobbies, merlins, and owls do much more good than harm.

Step V. Application.—Those children in the country that are brought in contact with game, or to whom in after life the duty of preserving game may be entrusted, will show greater discrimination in the destruction of "vermin." But all children should show, after these lessons, an increased love of living creatures and a more intelligent appreciation of the numerous allusions in literature and history to game and game laws.

PRACTICAL HELP IN THE ARITHMETIC LESSON.

BY GEORGE COLLAR, B.A., B.SC.,
Joint Author of "A New Arithmetic."

AS a rule, the subject of vulgar fractions is well taught, and suitable concrete illustrations are generally employed. The teaching would, however, be still more effective if the teacher would try to present the subject in more aspects than one. If only one point of view is set before the class, and one method only is given for working, the ideas become narrow and the operations mechanical; whereas if the child can look at the matter in several ways, not only are his views broader, but he is able to choose his method and work each particular example by the special method which is most appropriate for it.

The usual way of showing the meaning of a fraction is to suppose a unit to be taken and divided into a number of equal parts, and a certain number of those parts taken. This, of course, is quite correct, but it is not the only way of looking at a fraction. Thus the fraction $\frac{2}{3}$ is obtained, not only by dividing a unit into three parts and taking two of them, but also by taking two units and dividing this quantity into three equal parts. The teacher should draw a line a foot long, divide it into three equal parts and take two of them, and then draw another line two feet long, and take one-third of it. In each case it will be found on measuring that the portion obtained is eight inches long. A few illustrations of this sort will make the meaning of a fraction much clearer, and show that in every case (except in aliquot parts) two operations are involved, a multiplication and a division, and that, as far as the final result goes, it is immaterial which operation is performed first—one-third of two is the same as two-thirds of one. The former conception of a fraction will often make proofs of rules much more intelligible to children. It is very useful also in explaining the nature of a ratio, which, after all, is nothing but a fraction.

The theorem that the numerator and denominator of a fraction may both be multiplied or divided by the same number without altering the value of the fraction is easily taught when children understand the meaning of a fraction. As a rule, sufficient exercise is not given in converting a fraction into another one equal to it and having a given numerator or divisor; the only applications, as a rule, are to the reduction of a fraction to its lowest terms, and the reduction of two or more fractions to a common denominator. Let the children have plenty of exercise in finding equivalent fractions satisfying various conditions. If the fraction is to be brought to lower terms, the only care to be exercised is to see that the factor to be removed from one term is also found in the other. Thus, find a fraction whose denominator is 15 and which is equal to $\frac{21}{45}$. Here, in setting the example, we multiply 15 by 3 to obtain the denominator; so the numerator must also be a multiple of 3. This restriction can be removed when children understand the nature of complex fractions— $\frac{20}{45} = \frac{6\frac{2}{3}}{15}$, or $\frac{20}{45} = \frac{5}{11\frac{1}{4}}$. The converse exercise is even simpler, but the teacher should, at first at any rate, require the children to find a fraction one of whose terms is an exact multiple of the corresponding term of the given fraction. Find a fraction equal to $\frac{2}{7}$ whose denominator is 35.

If children have been properly taught how to find a fraction which is equal to another, they will have no difficulty in comparing one fraction with another. Thus, in finding which is the greater, $\frac{5}{23}$ or $\frac{20}{91}$, since 23 and 91 are large numbers prime to each other, much more multiplication is needed to bring them to a common denominator than to bring them to a common numerator; whereas any child can see that 5 and 20 are simply related, and if he has been taught properly, he can bring the fractions to a common numerator, either by multiplying the numerator and denominator of the first by 4, or by dividing the numerator and denominator of the second fraction by 4. $\frac{5}{23} = \frac{20}{92}$, or $\frac{20}{91} = \frac{5}{22\frac{3}{4}}$. Then, from the nature of a fraction, it follows that if two fractions have the same numerators, that which has the smaller denominator is the greater fraction.

The want of a thorough drilling in this principle is the cause of much of the mechanical work that one sees in the simplification of complex fractions. In simplifying such a fraction as $\frac{\frac{1}{2}}{\frac{3}{4}}$, it never seems to occur to teachers to instruct their children to multiply numerator and denominator by 4 (the L.C.M. of the two denominators). This gives $\frac{2}{3}$ at once, and the child who works that way understands what he is doing all the while; but it is doubtful whether many of the children who multiply the numerator by the inverted denominator have an intelligent appreciation of the nature of the process.

In teaching addition and subtraction of fractions, the great difficulty is to convince the children of the necessity for reducing the fractions to a common denominator. This is most easily done by insisting on the function of the denominator as the "naming" part of the fraction. It shows and names the *kind* of thing we are dealing with, whether sevenths, fourteenths, or twenty-eighths. And since like quantities only can be added together, it is necessary to bring the fractions to the same denominator if they are different to begin with.

Much time is lost in addition and subtraction of fractions by converting mixed numbers to improper fractions before adding or subtracting them. The whole numbers should be added or subtracted separately, and then the fractions. This gives the pupil smaller numbers to deal with, which is always an advantage, as it diminishes the risk of slips in the working. If the results of the addition or subtraction have to be multiplied or divided, the mixed numbers may be converted to improper fractions before adding or subtracting them, as the conversion will have to be made at some time in that case.

In teaching multiplication of fractions, the advantage of regarding $\frac{2}{3}$ as $\frac{1}{3}$ of 2 becomes apparent. Suppose we have to multiply a fraction $\frac{5}{7}$ by $\frac{2}{3}$, the work can be reasoned out in steps, for we have to take $\frac{2}{3}$ times $\frac{5}{7}$—that is, $\frac{1}{3}$ of 2 times $\frac{5}{7}$.

Since 5 shows the number of sevenths, it is evident that 2 times $\frac{5}{7}$ is $\frac{10}{7}$—that is, $\frac{2 \times 5}{7}$.

Next we have to find $\frac{1}{3}$ of this fraction. If the numerator of the fraction were a multiple of 3, it is evident that we could obtain one-third of the fraction by taking one-third of the numerator; for since a third of 27 marbles is 9 marbles, so a third of 27 thirty-fifths must be 9 thirty-fifths. On the other hand, whether the numerator is a multiple of 3 or not, we can obtain a third of the fraction by multiplying the denominator by 3. The denominator shows into how many parts the whole is to be divided, and if the whole is divided into three times as many parts, each part will be a third the size of the original part—that is, twenty-firsts instead of sevenths. Hence, if we take the same number of them, the total will be of only one-third the value. From these steps in the operation

$$\begin{aligned} \tfrac{2}{3} \text{ times } \tfrac{5}{7} &= \tfrac{1}{3} \text{ of 2 times } \tfrac{5}{7} \\ &= \tfrac{1}{3} \text{ of } \frac{2 \times 5}{7} \\ &= \frac{2 \times 5}{3 \times 7} \end{aligned}$$

we deduce the rule that we multiply the numerators together for the new numerator, and multiply the denominators for the new denominator, previously cancelling if possible.

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

JAMAICA (*Continued*).

THE Sugar Convention of Brussels, which came into force September 1, 1903, will last for at least three years. The suppression of direct and indirect bounties may restore prosperity to the Jamaican planter.

Ramie.—This useful fibre, known also under the names "rhea" and "China-grass," succeeds admirably, producing four or five cuttings a year. The quality of the fibre has a very wide range, so that it has been used experimentally as a substitute for cotton, hemp, flax, wool, and silk. The plant is particularly suitable for cultivation by small settlers, as the only process for preparing the product for market is that of "retting," which means rotting or partially fermenting to facilitate the separation of the fibre from the waste.

Commerce.—The trade returns of Jamaica during recent years show steady improvement.

	1900.	1901.	1902.
Imports.....	£1,844,000	£1,754,000	£2,029,000.
Exports.....	£1,868,000	£1,939,000	£2,292,000.

In 1900 the imports consisted of—textiles, £444,000; fish, £167,000; flour, £133,000; rice, £44,000, etc. The exports were—bananas, £618,000; sugar, £165,000; coffee, £157,000; rum, £152,000; oranges, £115,000; spices, £110,000, etc.

Jamaica presents an object lesson to other West India islands. It is not by any means so well placed to reach outside markets, yet it has cultivated an export fruit trade that is standing its people in good stead when other branches of agriculture have been languishing. Fruit accounts for over 50 % of the whole export trade of the island. The exports to the United States continue to increase in total value, and in proportion to the whole amount of the trade. The exports to the United Kingdom have a tendency to diminish. Even the increase in the English fruit trade is counterbalanced by a corresponding increase with the United States, which country has hitherto almost monopolised the fruit exports. The United States takes about 60 % of the whole exports, the United Kingdom 20 %. The imports from each country are almost equal in value, amounting to about 44 % each.

Towns.

Kingston, the capital, situated on the northern side of a landlocked harbour, has a population of 47,000. It was founded about 1700, after Port Royal was destroyed by earthquake. In the old church rest the remains of John Benbow (1650–1702). This old sea-dog with one vessel kept up a running fight for five days with a French squadron. He died of wounds received during the engagement. Anthony Trollope thus described the city in 1860:—"Kingston, on the map, looks remarkably well.....More than half the streets are not filled with houses. Those which are so filled, and those that are not, have an equally ragged, disreputable, and bankrupt appearance. There never was so odious a place in which to move. The street is neither paved nor macadamised, nor prepared for traffic in any way. In dry weather it is a bed of sand, and in wet weather it is a watercourse. There are articles which they call omnibuses, and which ply cheap enough—that is, they will do so if you can find them. They do not run from any given point to any other, but meander about

through the slush and sand, and are as difficult to catch as the mosquitoes. As it is now, Kingston is a disgrace to the country that owns it." The capital has improved since then, though until very recently the odours from the open drains left much to be desired. The thoroughfares are at least passable, and a tramway runs into the suburbs.

Port Royal presents an interesting appearance when viewed from the sea. It is an important naval station, and its dockyards, forts, and towers, its guardship, gunboats, and tenders in front of the roofs and turrets of the town beyond make an exquisite picture in the transparent air. The North American and West Indian squadron visits the port every spring.

Spanish Town was the capital from 1758 to 1872. Trollope described it as being like the city of the dead, except for the frightfully hideous race of pigs that wandered through the streets. "They are the very ghosts of swine, consisting entirely of bones and bristles. These brutes prowl about in the sun, and glare at the infrequent stranger with their starved eyes, as though doubting themselves whether, by some little effort, they might not become beasts of prey." The inhabitants number only 5,000.

Port Antonio, once almost deserted, is now again a thriving town. It is largely engaged in exporting fruit to the United States.

Miscellaneous.—There are 195 miles of railway open. The first line was opened in 1845; in 1889 an American syndicate purchased the whole length. At the last census the population of Jamaica was 639,000—whites 14,000, half-breeds 121,000, and blacks 488,000. To rid the sugar plantations of the rats that infested them the mongoose was imported. The rats were exterminated, but the mongoose increased so rapidly as to become a positive plague; lizards, snakes, and birds have been so preyed upon that insect pests now abound. The current weights and measures are those of Great Britain, but American coins are largely in use. The Colonial Loans Act of 1899 was adopted to bring relief to impoverished West India islands. Jamaica in 1902 benefited by £453,000. Cricket, tennis, and football are popular sports in the chief towns. Yellow fever, owing to improved sanitation, is to be little feared in the towns. About 1,500,000 acres of rich land are awaiting cultivation.

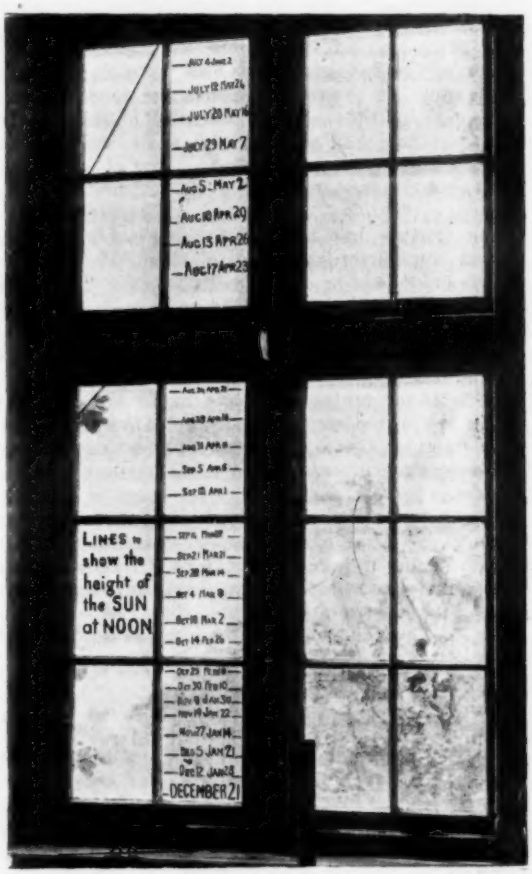
INDOOR STUDIES OF THE ALTITUDE OF THE SUN.

BY W. D. LEWIS.

A WINDOW in a room having a south, south-east, or south-west aspect provides a convenient opportunity for studying experimentally in class the varying altitude of the sun day by day, and of building up by a simple and graphic method a diagram on the window of the various changes of position during the course of one year.

The window whose photograph is here reproduced is one which faces the south-west, and through which the sun can be seen at true noon, and thus mid-day observations were possible. Classroom windows with other aspects provide opportunities for carrying out this exercise at other times of the day. For this purpose sundial or *apparent* time should be used, not clock or *mean* time. To students of this subject it is well known that sundial time does not correspond with clock time; only on and about four days in the year this coincidence takes place. A table of such differences is given in Whitaker's and other almanacs, showing how much before or after the clock the sun time is fast or slow, this variation being as much as 16¼ minutes fast or 14¼ minutes slow on some days. The figures for this equation of time are given for each day.

But there is a serious difference between clocks in different longitudes. Take a place 3° W. long., as Abergavenny, etc. Local time here should be 12 minutes *later* than at Greenwich (4 minutes for each degree), while at a town in the eastern counties, half a degree E. long., the clock time would be two minutes before Greenwich time.



From these two considerations connected together, it will be seen that Abergavenny sun time will not only be 12 minutes slow, but on February 11 apparent time is slower than clock time by 14 minutes 25 seconds. This gives a difference of 26 minutes 25 seconds between Greenwich time and sundial time (see *Practical Teacher*, January 1904), so that if an observation be required at 11 a.m. on February 11, it must not be made before 11 hours 26 minutes 25 seconds after 11. So if we move on to December 26, April 15, September 2, June 16, the only deviation in time will be owing to longitude; but supposing we take November 2, when the sun is faster than the clock by 16 minutes 21 seconds, then our eleven o'clock observation at Abergavenny must be made not at 11 a.m., nor at 16 minutes 21 seconds to 11, but, allowing for the twelve minutes for difference

of longitude (3° E. long.) from Greenwich, at 4 minutes 21 seconds to 11. And so on. A little patient preparation by the *teacher* will remove any seeming difficulty here. Remember then, get an almanac or sundial to show the equation of time for each day in the year, and a calculation made as to the deviation of local clock time from Greenwich will provide the two data for the correct development of this exercise, which will become very fascinating.

Thirdly, get a light flat pole with a hole bored at the top, at a height to suit the average stature of the class. Cover this hole with a piece of smoked glass. Retire such a distance from the window that the highest altitude of the sun on the longest day and the lowest position on the shortest day can be viewed from the selected position for the screened hole. For a window, as in photograph, which is six feet from the floor and six feet high, the point of observation, marked by a stud in the floor for the end of the rod, is about three to four feet from the glass; while for a lower sill and shorter window the position would be nearer, and for a higher window the observer must be further out in the room.

So much for the equipments of the teacher, who is now prepared to superintend the simple observations of the children themselves, and thus to carry out these instructions, which, while seeming rather long and wearisome in their detail, will amply repay any amount of study needed.

A child steps out of the class, and, holding the pole vertically, places one end on the stud, and through the hole at the other end views the screened sun; a second child takes a pointer and marks on the glass, as directed, whereabouts the sun is seen. The end of the pointer, dipped in ink, makes a small, neat horizontal line. This is continued on sunny days at intervals of a week or so for markings, and thus in the course of the year fifty more or less lines provide a record of altitudes done by the children themselves. This takes only a minute or so, therefore no objection can be made to the interference with school routine. A sheet of paper on the wall close by could contain the dates of these markings, while it may be possible to have these again transferred to the glass, as in the photographed window, where there are records for fifty-seven days.

The interest among the children in these experiments seems to increase more and more as the marks increase day by day, and on clouded days the position of the sun behind the clouds can be accurately pointed out. Many curious questions arise from the class, and a great number of opportunities will be given for pleasant and useful chats; and in thus satisfying curiosity and exciting expectation patience is developed in investigation, and the stores of healthily-gained knowledge increased. I ask my fellow-teachers to try the plan.

A SCHEME OF ENGLISH.

NOTHING indicates so forcibly the progress that has been made in the art of teaching during the last few years as the increased importance that has been attached to education as opposed to instruction.

"The old order changeth, yielding place to new." Strings of dates no longer pass muster for history, or lists of mountains and rivers for geography, but, with perhaps the single exception of elementary science, there is no subject that shows this improvement to such a degree as English. A few years ago, in the teaching of English, grammar was divorced from composition, and frequently degenerated into simply driving home a few more or less mechanical rules to enable the children to make some passable attempt at parsing and analysis; nor was this entirely the fault of the teachers, for many inspectors tested the instruction in the subject entirely by exercises in parsing and analysis, frequently setting archaic figures of speech or anomalous constructions that were far beyond the mental grasp of average children. Small wonder, then, that a sigh of relief went up when grammar was made an optional subject, and that it immediately disappeared from the time-tables of most of the schools in the country; for Herbert Spencer voiced the general feeling of the time when, in his "Essay on Education," he rejoiced that children were no longer taught such a ridiculous subject as grammar.

Subsequent experience, however, has shown that the teaching of grammar is not so ridiculous as was then supposed, and the present code insists that in every elementary school instruction shall be given in English, "by which is to be understood reading, recitation, writing, composition, and grammar, in so far as it bears upon the correct use of language."

Here, then, we find that grammar has its true function assigned to it, but it is left entirely to the teacher's judgment to determine to what extent the correct use of language is influenced by grammar, and unfortunately, in many cases, the old prejudice against grammar still lingers, and so the subject is cut down to the barest possible minimum. In order, therefore, that the subject should occupy its proper place in the general scheme of work for the school, it is advisable to discuss briefly the educational benefit derived from its study.

In estimating the educational value of the different subjects that appear in the school curriculum, or, as Bacon quaintly puts it, "the relative value of knowledges," we must consider two points—first, the intrinsic value in after-life of the facts acquired; and secondly, the extent to which the subject will assist the mental development of the child; and of these two the latter is undoubtedly the more important. Judged in this way, grammar should occupy a very important place in the school curriculum, both for its intrinsic value in assisting the child to speak and write correctly, and also for the excellent mental training it affords. It is often argued that grammar is absolutely valueless as a means of teaching the correct expression of ideas, since many persons speak correctly who have never learned a rule of grammar in their lives—in fact, that children acquire their manner of speaking, either correctly or incorrectly, from those with whom they are thrown in contact. This certainly is, to a great extent, perfectly true, but surely the great end and aim of the teacher should be to enable the child to rise above its surroundings; and how is this to be done in the case of the use of correct English without some reference to the rules of grammar? Simply to make a dogmatic statement that a certain expression is wrong is of very little educational value—in fact, it often simply closes one door and opens another. Thus it is not uncommon to hear people, who as a rule speak good English, make use of such an expression as, "This is to be divided between you and I." Here, evidently, the person has been corrected of using the objective for the nominative; but as no reason was given, the correction, "like vaulting ambition, o'erleaps itself and falls on the other." Grammar is usually defined as the art of speaking and writing

correctly, but this definition applies to composition, grammar being the science on which that art is based; and it is as illogical to contend that grammar is useless because many people speak correctly without learning grammar, as it is to condemn the teaching of the science of agriculture in rural districts because farmers have cultivated their land for many generations without the aid of definite scientific teaching, or to point the finger of scorn at the science of hygiene because many people have lived to a ripe old age with only an empyrical knowledge of the laws of health. But apart from its practical use in enabling the child to express its thoughts correctly, grammar is of inestimable value as a means of developing the intellect: the reasoning powers, the memory, and the judgment are all exercised and strengthened by a judicious course of grammar. As an exercise of the reasoning powers, grammar has no rival except deductive geometry; but constant care and supervision are required to prevent the exercises being performed in a mechanical or perfunctory manner. When an answer is given, even if it is correct, the reason for giving that answer should be ascertained; and when a mistake has to be corrected, the correction should not take the form of a dogmatic statement, but the children should be led to see for themselves where the error lies, and then set to amend it. But grammar not only strengthens the reasoning powers; it also matures the judgment. In this respect it is superior to Euclid, for in solving a proposition the solution must be either right or wrong; but in deciding a difficult point in grammar there are often grounds for two or three conclusions, and the judgment must be exercised to decide which has the strongest claim. The synthetic side of grammar affords even a wider scope for the exercise of judgment than the analytic, for in the construction of a sentence we may have the choice of half a dozen words which are almost synonymous and yet possess slightly different shades of meaning, so that the selection of the most fitting calls for a distinct effort of judgment.

Grammar has still another and a higher claim for inclusion in the school curriculum, since it cultivates one of the most important phases of the æsthetic faculty. It is one of the attendant evils of a cheap press that a flood of ephemeral and worthless literature is being continuously poured forth, and for every grain of literary wheat we have many bushels of worthless chaff. Under these circumstances, it is most important that children should be trained to recognise the beautiful in language itself, and to appreciate a writer for the beauty and purity of his language, irrespective of the ideas it clothes or the tale it tells. With regard to the actual teaching of the subject, one cannot too strongly insist upon the fact that composition should go hand in hand with grammar, and as the children learn to analyse they should also learn to construct. Commencing, then, with analysis, the children should be taught to divide a sentence into subject and predicate—that is, to recognise what subject the statement is about, and also what statement is made about that subject. Very short, easy sentences should be taken first; for example—

Subject.	Predicate.
1. The dog	barks.
2. The children	are playing.
3. The black cat	caught a mouse.
4. A blackbird	was whistling merrily in the tree.

Perhaps it is advisable here to refer to the illogical custom that is very prevalent of calling the finite verb the predicate. The predicate is that part of the sentence that makes a statement about the subject, and it is ridiculous to say that the whole statement made about *the black cat* in Ex. 3 is that it *caught*, or of *a blackbird* in Ex. 4 that it *was whistling*.

When the children are able to divide a sentence into its two fundamental parts, they should be exercised in picking out the nominative of the subject and the finite verb of the predicate, and in this way parsing and analysis will go forward hand in hand. When the children can divide easy, straightforward sentences, they should be led on to longer and more difficult ones, such as—

1. "Merrily, merrily shall I live now."
2. "Never a word spake he."
3. "Around the fire one winter's night
   The farmer's rosy children sat."

This will ensure the work being done intelligently, and prevent the children falling into the habit of calling the first part of the sentence the subject and the latter part the predicate.

The composition exercise at this stage would consist of exercises in the formation of sentences either by supplying an appropriate predicate to a given subject, or *vice versâ*. This composition exercise should not be confined to the set composition lesson, but in oral lessons the teacher should, as a rule, insist on answers being given in complete sentences. This will involve a little extra time and trouble in the lower standards, but the teacher will be amply repaid when the children commence to write a continuous piece of composition. When the children can divide a sentence into subject and predicate, and pick out the finite verb from the latter, the function of the remainder of the predicate must be dealt with. A few examples will serve to show the difference between verbs of complete and of incomplete predication.

Subject.	Predicate.		
	Finite Verb.	Completion.	
		Object.	Complement.
1. The shadows	fall.		
2. We	heard	the sweet bells.	
3. They	took	him	prisoner.
4. John Gilpin	was		a citizen.

In the first sentence the finite verb is sufficient to make a complete statement about the subject, and is therefore a verb of complete predication; but in the other examples something is required to complete the predicate, and must therefore be placed in the division devoted to the completion of the finite verb. The above examples will serve to show that the nature of the completion may vary. In Sentence 2 we have a transitive verb which requires an object to complete it, but the object in Sentence 3 is not sufficient to complete the statement, and a complement is necessary, while the copulative verb in Sentence 4 takes a complement without an object.

Sometimes it is necessary to extend or modify the statement that is made, so a further column must be ruled to receive those words or phrases which are used, not to complete the statement, but to limit or modify it in respect to time, place, manner, etc. This is commonly called the extension of the predicate, but modification would perhaps be a better term.

Similarly the children will see that the subject consists of two parts—the nominative, and words or phrases

that enlarge the meaning of the nominative. The class is now able to analyse fully any simple sentence; for example :—

Subject.		Predicate.			
			Completion of Finite Verb.		
Nominative.	Enlargement of Nominative.	Finite Verb.	Object.	Complement.	Extension of Finite Verb.
1. We		left	him	alone	with his glory.
2. Piper	(1) The (2) smiling first a little smile	stept			into the street.
3. You		may see	him	pass the little Grande Place.	
4. Ruler	(1) The (2) of the west wind	blew	the fragments		(1) backward from him. (2) with the breathing of his nostrils.
5. Minstrel	The	was		infirm and old.	

Now that the pupils can recognise the different parts of a sentence, they are in a position to distinguish the parts of speech by their functions in the sentence. And it may not be altogether superfluous to point out that the function of a word in the particular sentence under consideration is the only reason that can be allowed for classifying that word as a certain part of speech; and it is ridiculous to parse a word as "an adjective used as a noun" or "adverbial conjunction," for if the word is fulfilling the function of a noun or of a conjunction, it is perfectly immaterial what may be its usual function. At this stage the inflection of the noun to show number should be taught, and also the simple division of tense into present, past, and future.

In composition the children could now be given a simple sentence and set to enlarge the subject or extend the predicate. The subject could be enlarged by an adjective, a noun in possessive case, or by a phrase; and elliptical sentences should be given to exercise the children in each of these, the mental effort being greater if in each case there are only a few words that will serve to fill the ellipsis properly :—

"The — — son is called the Prince of Wales."

"As the — weather approaches the swallows leave us."

Exercises in changing the number of the subject of the sentence or the tense of the finite verb will be found to be very useful. For example, reproduce the following sentences, changing the number of the subject and making any other changes that may be necessary :—

1. "The rat is a destructive animal, and when it gets into the rick it does a great amount of damage."

2. "The leaves of the beech tree are changing colour, and soon they will fall."

3. "A tiger's paw is larger than a cat's."

Exercises on tense would take the form of rewriting sentences, altering the verbs in each case from the present to the past or the future. In the case of the future tense care must be taken to make the children conversant with the proper use of *shall* and *will* by such exercises as the following.

Supply the proper auxiliaries in the following sentences:—

1. "We — never give up trying, for we are determined that we — not be beaten."

2. "It is useless to resist, for I — go."

3. "He — not steal."

4. "Thou — not steal."

Having now grasped the fundamental principles underlying the construction of a simple sentence, it is an easy matter to show that complex sentences are formed by the substitution of a clause for a single word. There are three kinds of subordinate clauses—the noun clause, the adjective clause, and the adverb clause—and in every case these carry out the duties of the part of speech from which they derive their name. It is not sufficient, therefore, simply to name the kind of clause, as this only leads to guess-work, but in every case the function should also be given. Thus in the case of a noun clause it is necessary to state whether it is the subject or object of a verb, the object of a preposition, or in apposition to a noun or pronoun; in the case of an adjective clause, the noun or pronoun it qualifies, and the verb, adjective, or adverb which is modified by an adverb clause.

The class may now be taken through a course of exercises on the construction of compound and complex sentences, preparatory to commencing continuous composition. This is an exceedingly important step, and one that is unfortunately often neglected—the children being set to reproduce a story without any preparation, with the result that the composition consists either of short detached sentences or of sentences that are long, involved, and frequently, as a result, ungrammatical.

A *compound sentence* consists of two or more simple sentences joined by a co-ordinate conjunction; but these sentences do not always hold the same relation to one another, and in order to bring out the true sense the proper conjunction must be used. The chief classes of co-ordinate conjunctions are :—

1. *Cumulative* (expressing addition)—and, as well as, not only.....but also.

2. *Adversative* (expressing a contrast)—but, still, yet, nevertheless.

3. *Alternative* (offering a choice)—or, else, or else.

4. *Illative* (drawing an inference)—for, therefore, so.

Exercises of the following nature should be given to make the children familiar with the correct use of these conjunctions.

Join the following sentences, using the correct co-ordinate conjunction :—

"Alfred attacked the Danes. He was defeated. He retired to Athelney."

"He is rich. He is charitable."

"He is poor. He is happy."

"He is industrious. He is prosperous."

"The dog is lost. The dog is stolen."

A *complex sentence* consists of a principal sentence and one or more subordinate clauses.

The *noun clause*, as a rule, does not present much difficulty; it is often introduced by the conjunction *that*, or by the relative adverbs *when*, *where*, *how*, and *why*.

Combine the following simple sentences into a complex sentence containing a noun clause :—

"The city could not hold out much longer. It was rumoured."

"You are always late. I cannot understand the reason."

The *adjective clause* is generally introduced by the relative pronoun *who*, *which*, or *that*, or the relative adverb *where*. The adjective clause should always stand as near as possible to the noun it qualifies, to prevent ambiguity.

Introduce an adjective clause at the place indicated :—

"The house X is pulled down. (I was born there.)"

"The hotel X has a splendid view. (The hotel is the highest in the district.)"

Correct the ambiguity in the following sentences :—

"Milk should never be given to a child which has not been boiled."

"The woolly hair on his head, which is very thick, protects his brain from the heat of the sun."

The *adverb clauses* differ very much in the sense in which they modify the verb, adjective, or adverb, and a suitable conjunction must be selected to meet that sense. The following are some of the relations expressed by adverbial clauses and the conjunctions used with them :—

1. *Cause or reason*—because, since, as.
2. *Purpose*—that, so that, in order that.
3. *Conditions*—if, unless.
4. *Time*—while, before, after, since, when.
5. *Comparison*—as, than.

Plenty of exercises should be given in the formation of compound and complex sentences, and then, and not till then, continuous composition should be attempted. The class is now able to analyse any fairly straightforward sentence, and should begin to take an intelligent interest in some of the nicer points of grammar. Thus the nominative absolute and its use will provide material for a useful exercise. Thus—

Combine the following sentences into one simple sentence, using the nominative absolute :—

1. "The king was dead. His successor was proclaimed."

2. "The lease has expired. The premises will come down."

Voice and mood should be dealt with, and exercises given in rewriting sentences, changing the finite verb from the active voice to the passive. The matter of tense should receive more ample treatment at this stage, and the construction and use of the indefinite, the progressive, and the perfect form of each of the three tenses should be explained.

Exercises should now be given on the conversion from direct to oblique narration, and *vice versâ*.

The case that involves the most difficulty is the one in which the principal verb is in the past tense, for then the tenses of the verbs in the reported speech must be changed to fit the sense, and suitable adverbs selected.

Rewrite the first two of the following in oblique narration, and the third in direct :—

1. "Haply some hoary-headed swain may say, 'Oft have I seen him at the peep of dawn.'"

2. "'Thank you, father,' replied Harry. 'I will remember what you have just told me; and when I do my exercise to-morrow, I will try to be more careful.'"

3. He assured me that he was speaking the truth, and that he had not seen my cousin since the previous day.

The use of the non-finite parts of the verb is a point that is frequently overlooked or treated in an indefinite way. The parts of the verb that are non-finite are the infinitive, the participles, and the gerund. Of these the infinitive may fulfil the function of—

(*a*) A noun, by forming the subject, object, or complement of a verb. For example :—

"*To suffer* is the lot of all mankind."

"We should learn *to help* others."

"They let the prisoner *go*."

(*b*) An adverb or an adjective :—

"Fools, who came *to scoff*, remained *to pray*."

"He had nothing *to eat*."

The participles are used to qualify nouns and pronouns, thus resembling adjectives, or they may be used absolutely :—

"*Rolling* stones gather no moss."

"The clouds *having rolled* away, we resumed our journey."

The gerund resembles the participle in form, but it always has the function of a noun :—

"*Writing* was always a difficult task to him."

After a systematic course on these lines, children should have no difficulty, when they come to letter and essay writing, in clothing their ideas in language not only grammatically correct, but also possessing some slight literary style. The study of prefixes, suffixes, and roots will help to extend the vocabularies of the children; and for this purpose, too, exercises should be given in the proper meaning and use of words, such as the substitution of equivalent words or contraries, and also the discrimination of words nearly allied.

1. Substitute words for those in italics without altering the sense of the sentence :—

(*a*) "*Discretion* is the better part of *valour*."

(*b*) "We have *recently purchased* these *premises*."

2. Write sentences bringing out the difference in meaning between *famous* and *notorious*, *discovery* and *invention*, *aware* and *conscious*.

Such, in brief, are the lines on which the subject can be logically and systematically taught, so as not only to lead to the use of clear and correct English, but also to provide an excellent mental training.

The following outline scheme is one that has been approved by H.M. Inspector, and found to work in a very satisfactory manner :—

Standards I. and II.

A. The division of an easy sentence into subject and predicate.
To pick out the nominative of the subject, and the finite verb.
To recognise nouns and personal pronouns.

B. To supply a predicate to a given subject.
To answer questions about familiar scenes and objects in complete sentences.
To substitute personal pronouns for nouns.

Standard III.

A. Full analysis of a simple sentence, showing—(*a*) subject and predicate; (*b*) nominative, enlargement, finite verb, completion, and extension.
To recognise the adjective, the adverb, and the preposition by their respective functions, in every case pointing out the word to which each is related.
Division of tense into present, past, and future.
The inflection of the noun to show number.

B. To supply appropriate enlargements to the subject and extensions to the finite verb.
To substitute adjectival and adverbial phrases for adjectives and adverbs.
To rewrite sentences, altering number and tense.

Standard IV.

A. To analyse co-ordinate sentences.
Functions and classification of conjunctions.
The comparison of adjectives and adverbs.
The use of the relative pronoun.

Inflection of the noun to show gender and case.

B. To substitute longer phrases and clauses for nouns, adjectives, and adverbs.

Exercises on the correct use of copulative, adversative, alternative, and illative conjunctions, to express addition, contrast, choice, and inference respectively.

The substitution of a relative pronoun for a personal pronoun and a conjunction.

Exercises in synonyms and contraries.

Standard V.

A. To analyse complex sentences, showing in every case the exact function of the subordinate clause.

Classification of verbs.

B. To reproduce a short story in simple prose.

The use of the full stop and of the comma.

The formation of nouns, adjectives, and adverbs from each other.

Standard VI.

A. To analyse more difficult sentences.

To consider the more uncommon examples of nouns in nominative and objective case—for example, nominative and objective in apposition, nominative absolute, nominative of address.

The inflections of the verb to show voice and mood.

To extend the knowledge of tense to distinguish between the indefinite, progressive, and perfect forms of the three tenses.

B. To write a short letter or more difficult story.

Exercises on conversion from direct to oblique narration, and *vice versâ*.

The use of the colon and of the semicolon.

The more common Latin and English prefixes and suffixes, with meanings and examples.

Standard VII.

A. The analysis of any sentence.

The functions of the non-finite parts of the verb —the infinitive, the participles, and the gerund.

B. To write an essay on some familiar subject.

The most common roots and their derivatives.

NOTES ON AN EXPERIMENTAL COURSE OF LESSONS ON AIR AND WATER.

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THE following notes are intended to furnish experiments and facts whereon the teacher may build up a course of lessons. The merest framework is given, because the author felt that the teacher, knowing his class and the local circumstances, could best use his own sense of proportion in judging which parts to develop and which to pass quickly over. A further advantage of this skeletal plan is that the teacher is left free to adopt whatever method of presentation he pleases.

The lessons, with all the experiments, have been given at the village school, Wye, to the fifth, sixth, and seventh standards (mixed), using ordinary school appliances and inexpensive, and often home-made, apparatus. The children draw the apparatus after the experiment is performed, and briefly record the result; they also take notes on their own account. It is rarely necessary to explain a result; judicious questioning and careful following up of partially correct answers usually elicit the right explanation. The lesson then furnishes "copy" for an essay.

The lessons have also been given in the summer course for schoolmasters held at Wye each August, some of whom, in turn, have found them useful both for day and evening school work.

Some of the notes are intended for the teacher only; they may help him to answer the questions a child will put, and which somehow the text-book never seems to anticipate. But many of the children's questions can neither be foreseen nor answered.

SYLLABUS OF LESSONS.

Air.

Air, though invisible, is a real thing, and takes up space. It can be moved about; it resists the motion of bodies through it; it has weight; it exerts pressure; it can be collected, stored, and measured.

Air occurs almost everywhere—in soil, in water, and even at the bottom of the sea.

Behaviour of air on heating; ventilation.

Air is necessary for burning, also for plant life and animal life. Only one-fifth of the air is active in this respect; the remainder is not. The active portion is, however, exceedingly active.

Air as affected by breathing. Carbonic acid, and some of its properties. Plants and carbonic acid—the "balance of nature." Conditions under which plants take up carbonic acid; application to plants in the house. How carbonic acid travels from the town (where it is not wanted) to the country (where it is).

Water.

Universal occurrence—in air as vapour, in foods, etc.

How it gets into the air—evaporation. Cooling produced by evaporation; danger of wet clothes.

Boiling—its dependence on pressure. Cooking at high altitudes. Change of vapour to liquid; production of fog, mist, rain.

The freezing of water; expansion produced, and its effects. Melting of ice under pressure; formation of "slides," skating. Solution.

Impurities in water; purification of water—(*a*) by filtering, (*b*) by distillation.

Water in its relation to plants.

What water is made of.

Lesson I.

Air, though invisible, is a real thing, and takes up space.

Experiment 1.—Invert a tumbler in water, and push downwards: the water will not enter.

Experiment 2.—Fix a small piece of lighted candle on to a cork, float in a glass tank, place a large glass jar over it, and quickly push downwards. This is the principle of the diving bell.

Experiment 3.—To show that water presses on the air and tends to enter, take a bottle with a hole in the bottom, fix a toy squeaker through the cork, and push into water, keeping your finger on the squeaker. As before, no water enters; but on removing the finger, the air is forced out and a sound is produced.

Air can be moved about like a solid body.

Experiment 4.—Knock the bottom out of a box (one about 14 inches each way does well), and in its place nail a *loosely fitting* (this is very important) piece of calico. Cut a circular hole about 6 inches diameter in the lid, and fasten down. Stand the box on its side, fill with smoke, and smartly hit the calico. A ring of air is expelled; its shape and motion are rendered visible by the smoke. A candle is extinguished when struck by a ring even at a distance of 40 or 50 feet, and a person struck by one feels a distinct blow. Excellent smoke is obtained by putting in a few drops of strong hydrochloric acid and then of ammonia.

These rings have played an important part in the development of vortex theories of the atom and the ether, now so much in vogue among physicists.

Air in motion is called wind. Wind velocities :—

Calm	3 miles per hour.
Gentle breeze	18 miles per hour.
Strong breeze	34 miles per hour.
Fresh gale	48 miles per hour.
Storm	75 miles per hour.
Hurricane	90 miles per hour (rare in England).

Air resists the motion of bodies through it.

Experiment 5.—A flat piece of cardboard suspended edgewise from one corner will swing for a much longer time than if placed broadside on swinging about an edge. The time of each individual swing is, however, nearly the same.

Experiment 6.—Divide a sheet of foolscap into two very unequal longitudinal parts, the smaller strip being only about an inch wide. Stand on a chair or desk, hold both pieces up as high as you can, and let them fall to the ground. The narrow strip, offering less surface to the air, reaches the ground first, notwithstanding its lighter weight.

Experiment 7.—Select two feathers of about the same size; show that they take the same time to fall. Cut the barbs off from one: in spite of the loss of weight, the shaft falls more rapidly than the feather. In these two experiments a fall of about 12 feet is wanted.

This resistance increases very much with the speed of the moving body. The connection is

$$P = \cdot 0027\ V^2$$

where P = pressure in lbs. per square foot, and V = velocity of the body (or, of course, of the wind) in miles per hour. So the pressures would be :—

4	20	60	120 miles per hour.
·043	1·08	9·72	38·9 lbs. per sq. ft.

This limits the speed of bicycles, motors, and trains.

Air has weight.

Experiment 8.—Dry a litre flask (a larger one if you have it, but a smaller one will not do); close with a good cork through which passes a glass tube fitted with a piece of indiarubber tubing and a pinchcock. Weigh, pump air out, and weigh again. Open under water, measure the volume that enters; knowing the weight of this volume, you can calculate the weight of one litre or of one cubic foot.

One litre of air under ordinary conditions weighs about 1¼ grams, and a cubic foot 1¼ ounces. Accurate results cannot be obtained by this rough method.

Some gases are lighter than air; they tend to rise.

Experiment 9.—Place some zinc in a stout bottle; pour on some sulphuric acid. Fit the bottle with a cork through which a tube passes, and attach a toy balloon. Hydrogen enters. When fully expanded, tie the neck of the balloon with stout cotton, and disconnect from the apparatus. The balloon will rise to the ceiling.

Owing to the great diffusibility of hydrogen, the gas readily escapes through the skin; after a time the balloon sinks again. For the same reason the experiment must not be prepared too long beforehand. Coal gas is not a convenient substitute for hydrogen; it is difficult to get sufficient pressure.

Balloons have been sent to a height of about twelve miles; they rise till the weight of the balloon together with the gas contained equals the weight of the air displaced.

Other gases are heavier than air; they tend to sink.

Experiment 10.—Fill another balloon with carbonic acid obtained by the action of hydrochloric acid on marble. Use the same method as in the last experiment.

SOME ASPECTS OF NATURE STUDY.

BY E. A. GREENING LAMBORN, HEAD-MASTER S. MARY MAGDALENE SCHOOLS, OXFORD.

THIRD on the list of subjects which the New Code states should be included in the curriculum of every public elementary school is "knowledge of the common phenomena of the external world." This subject, shortly called "nature study," has been for some time one of much interest to the majority of teachers; and now that the Board of Education has made it an essential part of the elementary school course, it will doubtless command the attention of those teachers who, so far, have not varied from its prototypes, elementary science or object lessons. Some examination of the subject in its various aspects may therefore, at the present juncture, be not without interest.

To those teachers whose training was enlightened by former codes, and who had always to remember that their children's knowledge would be tested within a certain definite and specified syllabus, the question that naturally arises first is—What knowledge are we to teach and the children to acquire? This may be called the practical aspect of the subject.

In the first place, in the light of the New Code the two parts of the question above quoted are seen to have only a very slender connection between them. "The knowledge the child has to acquire" is no longer that which "the teacher has to teach." In fact, the time-honoured verb "to teach" is one which, as far as nature study is concerned, we must endeavour to forget. The child is to acquire the knowledge for himself, by the exercise of his own faculties of mind and sense; and the teacher's part is to *assist* him to do this by making him realise his possession of the necessary faculties, and by encouraging and directing their use. The mere possession of knowledge of the objects studied is no longer sufficient. The knowledge must be the result of the child's own efforts. And here it is of vital importance to realise that, not in this one subject only, but in the school work generally, the conception of the relative parts played by teacher and scholar has changed. Of old the child came to school to obtain the knowledge which would be useful or necessary to him in life's work. The teacher had the necessary stock, and he prepared it in the most digestible manner for the child to imbibe. It passed straight from the teacher's mem-

ory into the child's mind, with the minimum of mental exertion on the part of the latter. So long as the child obtained the information, the end justified any means, for it was the end alone which was examined. Now, the child comes to school, not so much for knowledge as for training in the power of independently acquiring it. Herein is indicated the distinction between Nature *Study* and Nature *Knowledge*—a distinction which every teacher should clearly grasp.

There are, then, two sides to the practical aspect of nature study—the utilitarian one, which is chiefly concerned with the syllabus of facts to be acquired; and the disciplinary one, which takes account of the training of the faculties by which these facts enter the mind. Now the knowledge which the children should obtain in the nature-study lessons is that which will give them an intelligent acquaintance with the natural facts and objects with which they come into daily contact. They should know, for instance, the names of the common trees, should be able to recognise their leaves or seeds, know the agency by which the seeds are scattered, and the chief insects and birds which peculiarly infest them. And they should possess similar knowledge of the plants and flowers which commonly grow in the district; and the various birds, which may always be *seen*, should become, in the true sense, *familiar* to them. This knowledge need not be "scientific" in its terms, neither should one seek to make it complete in detail. This is one point where an object lesson in nature study will differ from an object lesson in elementary science. In the case of the latter, the children were expected to acquire a complete account of the object, those facts which they could not obtain for themselves being supplied by the teacher, in order to "round off" the account. The number of objects dealt with in a year's course of nature study will, of course, greatly exceed the thirty objects of former codes. But as the number of lessons will remain the same, it is obvious that several objects must be dealt with in each lesson. These objects may be grouped in classes, as the frog, toad and newt, the rat, the vole and the squirrel; or they may be considered in their relationships to each other, as the honeysuckle and the bee, the sun, the air, winds and draughts; or, again, objects may be grouped to exemplify a natural law, as the hawk, the swallow, and the wood-pigeon—a comparison lesson to show the existence of a law modifying structure in relation to food. This realisation of the intimate relationships and interdependence of all created things was scarcely possible when each object formed a little separate and complete lesson in itself.

It is thus obvious that the teacher must no longer seek to "round off" the knowledge of objects, but only to introduce them to the child in such a way as to arouse his interest and curiosity, show him the way to get information from them, and then leave him to his own independent efforts to add to his knowledge. The knowledge he gets is not the teacher's affair, though it may seem heresy to say so. His concern is to "lead the horse to water;" the animal must drink of his own accord. Another very obvious distinction between "nature study" and simple "object lessons" is that lessons on manufactured articles—as knives, pens, paper, and, in most districts, iron, lead, etc.—must be omitted from the course of nature study, though they will still remain an admirable means of making the geography lessons interesting and concrete. Also such lessons as "The Camel," "The Lion," "Coffee," and the numerous class of "object" lessons taught from pictures, can find no place in real nature study. It is perhaps not so clear that lessons on such subjects as "the orange," "the banana," etc., are not truly nature study, because they cannot be studied in their own environment. The stuffed or mounted specimen, similarly, is, like the picture, though in a less degree, an abstraction. The full concreteness is lacking. A stuffed blue-tit may still be valuable for the examination of details, but the child's *conception* of the bird should be the image of the live tit he has seen hanging head downwards from a twig, or jerkily flitting from bough to bough in search of insects. Pictures and diagrams *may* be useful to supplement the children's observations; but judging from the number of "nature-study charts" recently published and "pushed" by publishers' travellers, there is some danger that the bulk of the "teaching" may be done by these means—in which case the "study" is a dead thing, and the term "nature" a misnomer. The writer, personally, prefers to rely on blackboard sketching for all diagrams.

With regard to the drawing up of a year's course of nature study, which is a matter of immediate consideration for teachers whose school year ends with September, it has already been pointed out that no list of thirty objects, however varied and typical, would give an adequate "knowledge of the common phenomena of the external world." This is indeed too wide a subject to be reduced to the limits of a definite syllabus or list of lessons. When a definite amount of knowledge was required for examination purposes, a fixed and inelastic syllabus was a necessity; but if a teacher now, for instance, proposed to devote a portion of the year's course to the study of rodents, he need not, at the beginning of the year, draw up a fixed list of the animals of that class which he proposes to deal with, though he will of course enter in his weekly record the animals he deals with as he proceeds. These can be chosen in due course as circumstances dictate. What is required to commence with is a *scheme* showing the lines on which the teaching or training will be given, rather than a *syllabus* or list of the objects to be dealt with.

But the subject is greatly limited by the word "common," which may fairly be taken to mean common in the environment of the child. Thus lessons on birds of prey, though in the usual sense these are "common," would not be included in a scheme of nature study for a town school. The grading of the subject also is herein indicated. The surroundings of a child widen with his years. The owl is a common bird to a boy of twelve, but is outside the circle of familiarity to one of six. The latter must be content with the sparrow or the swallow until his circle widens.

The scheme in use in the writer's school provides for a list of about fifty common things in the lower standards, to be dealt with in their season in the course of the year. In such a list may be included practically all the most typical natural objects "common" in the environment of a child of eight. But for the next group of boys, in the third or fourth standard, the scheme must expand with the age and experience of the children, and so it here provides for lessons on *classes* of objects, each lesson dealing with several members of the class, with the special aim of pointing out the characteristics which distinguish the family in common, and comparing those differences or modifications of structure which are the results of differences of habit or surroundings. For instance, in the lower standards,

lessons on "The Rat" or "The Rabbit" might be included, those being almost the only rodents familiar to small children. But in the next group the children would be familiar with many more of the same family, whose homes must be sought for farther afield than small children can go; and so a lesson on "Rodents" would be included, and the general facts of the family would be gathered from the study of the rat, squirrel, vole, and wild rabbit, while the comparisons between these would lead the children up to the subjects taken in the upper standards, which are the *laws and principles* the existence and the working of which are to be seen throughout all nature. The differences between the various members of the rodent family, for example, are seen to be in accordance with a natural law by which modifications of structure depend on different circumstances of environment. Thus the aim of the lessons in the upper standards will be to trace the working of this law in all the various creatures with which the boys are familiar—in the structure of the birds which get their livings in the air, in those which find theirs in the water, in the animals which live underground, in the trees which stand high above the earth, and in the plants which creep upon it. One law is seen to govern the structure of all—namely, that surroundings modify structure. So, if the lessons for the lower standards included one on "A Hawk," the scheme would provide for lessons, in the middle group, on "Birds of Prey," illustrated by the study of the sparrow-hawk, kestrel, and owl. The length of wing in relation to the size of body, the size of body in relation to the amount of digestive apparatus and the consequent power of flight, the hooked beak, the sharp curved talons, the large eye and the consequent keen sight which were seen to characterise the hawk studied by the small children, would now be observed in the whole genus. Then in the upper standards the boys would go on to deduce and study the *natural law which relates structure to food*, by reference to the structure of common vegetable and flesh eaters. The smaller amount of digestive apparatus, or stomach space, required by the latter to accommodate a more concentrated form of nourishment, the bearing of this on the shape and hence on the creature's activity, would be observed, and the application of the principle to man himself, by reference to the vermiform appendix, would show again the universality of law throughout all organic nature. The children would be led to observe, too, that both the principles before referred to—of structure modified by surroundings and food—are but *parts* of the universal law of evolution. Thus the child in the highest class is, at any rate, introduced to science proper.

From the discussion of the matter with which nature study deals we pass on to an examination of the subject in its disciplinary aspect. Every one realises the importance of giving a child some knowledge of the objects in his immediate environment, but it is still more important to realise that the great value of nature study lies, after all, in the training it affords in the power of obtaining information independently. There are teachers who are so impressed with the importance of nature knowledge that they are in danger of regarding it as an end in itself, and of imparting its facts almost as one would those of history or geography. But, unlike other subjects, the training nature study offers in the independent acquisition of knowledge is even more valuable than the knowledge itself. Nature study is to the simpler faculties of the senses what mathematics are to the higher faculties of the reason. It is by those "gateways of knowledge," the senses, that all our ideas of the external world enter the mind. Observation, then, or the exercise of the senses under the guidance of the will, is the first faculty to be trained by the study of the objects of the external world. Here, again, we have a primarily important fact which has a tendency to overshadow the importance of others which should be equally borne in mind. One of these is that training in deductive power is equally important with training in observation, and should always be concurrent with it. When a fact has been *observed*, only one step towards its full comprehension has been accomplished. The connected step is to *deduce* a further fact in explanation of the observed one. For instance, a child may, by an exercise of observation only, discover that the sides of the beaks of young birds are soft; but this fact is meaningless to him until, by a further exercise of reason and imagination, he deduces the reason of this softness—namely, that it enables the young bird to stretch the lower mandible to a point far exceeding the power of the old one, and hence to open his mouth to a correspondingly wider extent, so that the food brought by the parents is more certainly deposited in the gaping bill without danger of loss. Again, the child may further observe that the excreta of the young bird, unlike that of the old one, is enclosed in a membranous bag. The meaning of this fact he must deduce before it becomes a potential part of his knowledge, and it is only by some considerable mental exercise that he deduces the hypothesis that it is necessary to remove from the vicinity of the nest evidences of its existence which would lead to its detection, to say nothing of the further necessity for sanitary reasons. The enclosing bag renders such removal an easy matter for the parent bird.

It is in this exercise of their deductive faculties that children require most assistance. Their observation is naturally keen enough, and requires guidance rather than development. Yet there are many teachers who, having led the children to observe a fact which they could have observed for themselves without such assistance, tell them the meaning of it without allowing them to exercise their deductive faculties in the attempt to discover it for themselves. Children need no assistance in observing, for instance, the characteristic slit in the upper lip of the rabbit. Where the teacher can help them is in encouraging them to deduce the reason for it—namely, that by it the teeth are enabled to approach immediately to their object without danger of injuring the lip, which can be drawn out of the way.

Practice in associating the results of separate observations is also very important, as when the connection between them is seen their meaning is often made clear. For example, a child may observe the peculiar cup formed where the leaves of the common teasel join the stem. He may observe, further, that the cup contains water which has run down the leaves and been collected. Dead insects, as earwigs, may be noticed drowned in the water. If the child can associate the peculiar structure of the plant and the presence of the water with the dead insects, he has the key to the meaning of his observations, which is that the peculiar arrangement of leaves is a special device to protect the plant from noxious insects which would otherwise eat their way into it.

The way in which children may be trained, by nature study, in the powers of classification and generalisation has been already indicated in the scheme previously described, in which, from the study of an individual object, the children pass on to consider the whole class

to which that object belongs. It will be seen, also, that the scheme affords training in the power of abstraction in the upper standards, where objects are considered from one aspect only—their relation to some fundamental law or principle of nature, the facts not so connected being disregarded.

Another important aspect from which to consider the subject of nature study is in its bearings on other subjects of the school curriculum. It has already been shown that nature study is educational in the true sense, inasmuch as its aim is to develop the faculties rather than to store the memory with information. It holds the advantage over all other subjects in that it deals entirely with actual and concrete things, the facts connected with which can be acquired by the direct exercise of the child's own powers of mind and sense. But it thus serves as a model for the teaching in other subjects. Wherever these deal with concrete things, the children should be encouraged to apply to these objects the powers of observation and deduction which nature study has trained them to use. In the subject of history, for example, the majority of the facts, though of course originally the result of the observation of bygone historians, can only be obtained by children at second-hand in oral teaching or from books. But many of its facts are to be obtained as the result of their own observation of actual historical objects, of which there are so many in our country. They may observe the thick walls, small windows, and turreted roof of a mediæval castle, and the deductions they make therefrom are historical facts acquired by the exercise of their own faculties, and so much more valuable than if they had been told to or read by them.* So in geography, if a child actually sees a piece of land in the middle of a river or lake, he will learn for himself what an island is without the need of a definition or a picture bearing one, such as hang even now in most schools. Similarly, if he is allowed to follow a spring to a brook, and the brook to the river—a perfectly possible matter in a country district—he will better understand how a river is formed than by any amount of oral exposition. A dumb teacher might lead him to understand it. In fact, a dumb teacher might be a very interesting experiment.

Drawing and composition, too, should be primarily the expression of a child's observation of a given object, and so have a direct connection with nature study. Formerly a child was required to write about what he had not seen but some one else had told him, and to draw from the flat what some one else had seen in the round—in some cases what no one had seen or could see.

Poetry, too, is a subject which may well be connected with the nature study course. The beauties, both concrete and abstract, which the study of nature reveals may unite in their effect on the æsthetic faculties of the child mind with the effect of the beauties of sound and sense which the children are led to appreciate in poetry. Poetry is the beautiful expression of beautiful ideas, and the child's ideas of beauty are mainly connected with the concrete things of the external world—the flowers, the birds, the colours of the sky, the brightness of the stars, the snow, the tracery of the frost. The abstract beauties of love and the other passions with which the poets deal are as yet beyond his comprehension. Therefore, in making selections for the year's poetry, it is well to choose poems dealing, as nature study does, with concrete things of the external world.

So far we have considered the subject chiefly from the purely pedagogic points of view, which, however educational, are necessarily mainly practical. It remains to examine it in its effect on the youthful character generally—in other words, to see how far nature study, apart from its utilitarian and outward and visible results, is a means of general culture. For the possession of knowledge in itself is not culture, and intellectual training is only a means towards it. Nature study must, therefore, be raised above science, which seeks only knowledge and that mental training by which knowledge can be obtained, if it is to become a means of culture for the mental and moral faculties generally. It should partake of the nature of art, for "art is the worship of the beautiful by the human mind;" and the study of nature, rightly pursued, should impress the mind with reverence akin to worship for the beauty of design and workmanship which such study continually reveals. In "considering the works" we should "find out the Lord thereof." This was the aspect of nature study which appealed so strongly to Wordsworth, who averred that she, Nature,

> "Can so inform
> The mind that is within us, so impress
> With quietness and beauty, and so feed
> With lofty thoughts," that nothing
> "Can disturb our cheerful faith
> That all which we behold is full of blessings."

It is the gravest danger of nature-study teaching that the acquisition of plain, hard, scientific fact should be its only aim. If a child is not led to see deeper into nature than its material facts and principles, he will never realise the existence of the everlasting joy which, Keats assures us, is to be found in ideas of beauty. "A wise passiveness," we are told, may be as truly educative an attitude of mind as one of active inquiry into natural facts. Are we in danger of making our children small scientists, little collectors "who would peep and botanise upon their mothers' graves"? Is it generally realised that one of the greatest advantages of the expansion of elementary science into nature study is that it has been made possible to develop the moral and æsthetic faculties of the child side by side with the intellectual ones? If we consider intellectual advantages only, children regard flowers as intended for dissection; but if the æsthetic side is attended to, they learn to admire them, and treat them with tenderness.

As in the gathering of flowers, so in the collection of eggs, nests, and insects. All teachers do not realise the responsibility which rests upon them when they increase the facilities of the children for making collections. Children are naturally greedy, and they will not, unless properly trained, be satisfied with one or two specimens of a particular species. To reduce to reasonable limits this natural acquisitiveness of children should be a great aim in the *moral* training which nature study affords. It is a profound moral truth that

> "He prayeth best who loveth best
> All things both great and small,
> For the great God who loveth us
> He made and loveth all."

Surely love is greater than knowledge, and to have inspired a child with love and tenderness for the things of nature is to have accomplished a better thing than to have given him all that little knowledge of "the external world" which science yet possesses.

* In this connection the reader is referred to an article on 'The Teaching of History by Object Lessons" in the *Practical Teacher*, June 1904.

The Practical Infant-School Teacher.

A VISIT TO A SCHOOL DOING A NEW WORK.

BY PROFESSOR M. E. SADLER.

BEHIND the plain front of an old-fashioned house in Brunswick Street, Manchester, a work is going forward which has already inspired many teachers with new ideals, and is likely to influence for good the courses of study and the methods of teaching in many elementary schools in different parts of England. For here was established, nearly two years ago, the nearest English counterpart to Professor Rein's famous elementary school in Jena. In England we are so fortunate as to have at the present time a number of centres of educational experiment. In no branch of instruction has the new movement been so fruitful as in the training of children during the critical years when their character is being shaped and they are learning the elements of knowledge. In more than one other school in Manchester, and in many schools elsewhere, extremely interesting and valuable work is being done in the teaching and training of boys and girls, especially from about five to about twelve years of age. But the special task of the school in Brunswick Street is to make trial of these new methods of teaching under conditions which might without great difficulty be reproduced in a large number of our public elementary schools in town or country. The children who attend it would in ordinary circumstances have gone to the public elementary schools in their neighbourhood. And as the school is closely connected with the Women's Department of the Day Training College for Teachers at the University of Manchester, it is so placed as naturally to inspire a constant succession of teachers who are preparing themselves for work in public elementary schools. Thus the influence of the school in Brunswick Street spreads far and wide.

A CLASSROOM.

On entering the school, one is struck at once by the homelike feeling which pervades it. It is not simply a school; it is a home. And thus it recalls, to a degree rarely found elsewhere, the ideals of Pestalozzi. It is this homelike feeling which has so great an effect on the children. They feel for the school an affection and a sense of responsibility which are no unimportant elements in the educational influence of the place. In the comfortable north-country kitchen at the back of the house the children neatly lay out their own lunch, boil their eggs, and, in carefully-chosen groups, wash up the cups and saucers. They help the teachers to dust the schoolrooms, and to keep everything in order from hall to attic. It is one of the aims of the teachers who are in charge of the school to show, by example as well as by precept, that diligent and thoughtful housekeeping is a fine art, and worthy of all honour and imitation. The result is that the children come to see that, whether their task lies with books or with dusting, thoroughness and cheerful industry and delight in doing everyday tasks as well as they can be done are virtues, and that the care of a home affords scope for the exercise of intellectual and artistic gifts, as well as for patience and smiling self-control. The honour thus paid to the difficult and often delicate task of good housekeeping, combined with a delight in intellectual things and in the merry life of "a buzzing school," is a pleasant feature in the life of this vigorous little community. And the school appeals to the love of beauty which is in the heart of nearly every child. Through the generosity of Mr. T. C. Horsfall (without whose liberal aid and sustained encouragement the school could never have come into being), the walls are radiant with wall-papers designed by

William Morris. Over the mantelpiece in the kindergarten hangs a copy, in blue and white porcelain, of one of the beautiful medallions of Luca della

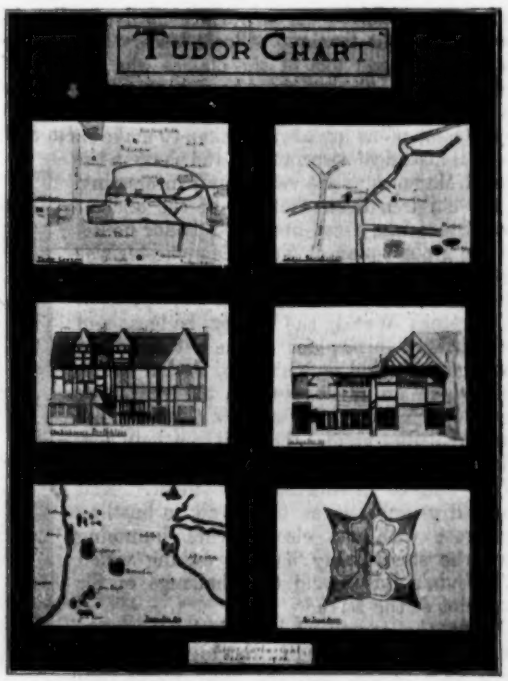
MODELLING THE HEMISPHERE.

Robbia. On the walls are a few well-chosen pictures. Here and there an old oak chest or cupboard makes a welcome change from the ordinary school furniture. In every room there are the signs of artistic interest and of the skilful adjustment of means to ends. All over the house the visitor sees the marks of personal interest and of good taste. The effect on the children is admirable. It is striking to see how proud they are of the school, and how much they appreciate the pains which have been taken in beautifying it. They take the utmost care of the rooms and protect the walls from being splashed with ink or soiled by thoughtless backs and fingers. This training in the enjoyment and careful use of beautiful things is no unimportant part of the humane education which the children receive.

"It is said that Sir Tarquin" (we read in an old history of Lancashire), "a stout enemie of King Arthur, kept the Castle in Manchester, and near to the Ford in Medlock hung a Bason on a Tree: on which Bason whosoever did strike, Sir Tarquin or some of his company would come forth and fight with him. Sir Launcelot du Lake, a Knight of King Arthur's Round Table, did beat upon the Bason, fought with Tarquin and killed him, possessed himself of the Castle, and loosed the prisoners. And whosoever thinketh it worth his pains to read more of it, may read the history of King Arthur." It was interesting to see a class of eighteen children, with a map of British Manchester on the blackboard and little modelling trays of sand on the tables in front of them, listening with eager faces to this picturesque fairy tale which links all the magical adventures of King Arthur's knights to the very neighbourhood in which they live. One of the great features of the school is the skilful teaching of literature. The aim is to stimulate and refine the imagination of the children from their earliest years. Thus they learn to love beautiful stories and good literature. And it is a remarkable proof of the wisdom of the methods of teaching that the children learn to express themselves clearly, composedly, and succinctly in their own mother tongue. In every class one hears the children, when asked by the teacher, giving in their own words clear, well-expressed, and sensible summaries of what they have heard or read about the subject in hand. And the beginning of all this kindling of interest in literature and of this power of self-expression is centred in the careful telling of well-chosen fairy tales. Greek stories, tales of the Celtic wonderland, and legends of chivalry are all skilfully used for this purpose. But pains are taken to train the power of expression through the hands as well as the power of expression through words. By being encouraged to draw or to model things or scenes which they have read or been told about, the children are set in the way of gaining greater clearness and precision of thought.

And the aim which is kept in view throughout these successful efforts to train the imagination is a very practical one. It is to enable the children better to realize beforehand the consequences which would be likely to follow from any given course of action. Is not this faculty of looking ahead, and of quickly and vividly forecasting probable consequences, a power which the English nation would find to be worth millions a year? Those who have laid their finger on this point of danger, and are quietly setting themselves to remove it, deserve all the help which they need. And the best way to remove the danger is by improving the methods of teaching in the schools.

Miss Dodd, who is the life and soul of the school, and her excellent colleagues, have endeavoured to accom-



A CHILD'S DRAWING, ILLUSTRATING THE TUDOR PERIOD.

plish three other purposes. They have tried to devise a course of school instruction which is valuable in itself

and will influence the future lives of the pupils. They have tried to avoid mechanical methods in imparting instruction. And they have spared no pains to make

A Lesson in Measurement.

the school life happy, without relaxing rightful discipline. There is no doubt that they have succeeded. The plan of the school studies shows the care with which the different subjects are, so far as may be, linked together, in order that the knowledge gained through the lessons may form a well-knit whole in the children's minds. In all the lessons a great point is made of getting the children to express themselves. Specially interesting is the teaching of local history in the school. A short time ago one of the classes was studying the Tudor period. The children have been taught to study the architecture of each period in connection with its history. Great pains are always taken to make them realise the local historical associations, and these in the case of Manchester are varied and interesting. So the children drew sketches of the ancient Seven Stars Inn, a well-preserved Tudor house, and the ground plan of Tudor Manchester was familiar to them, as were the outlines of an old map which showed the then conception of the Western World, the Tudor badges, and Shakespeare's birthplace. One set of these drawings, mounted on a sheet of brown paper, is shown in an illustration on the preceding page. In this way the history teaching becomes real and vivid. The children gain historical imagination as well as new powers of insight and of intellectual enjoyment. And who will grumble if, as they walk in bustling Deansgate with the electric cars humming down the street, they have a waking vision of Tarquin's Bason and the challenge of Sir Launcelot of the Lake?

Out in the courtyard behind the house, in front of the gaily-painted Italian loggia through which one passes into the playground beyond, you may see a class clustered round the quiet teacher, and listening with all their ears to a lesson in measurement as part of their study of the elements of geometry. When the weather permits, some of these practical lessons are thus taken out of doors.

In summer, teachers and children have a three days' school journey through moorland valleys in Derbyshire, with Kinder Scout as an object-lesson in geography, Haddon Hall the centre of history and romance, and pleasant adventures with birds and beasts. "Before Park Hall," wrote one of the children, "there were a lot of fields and trees and lawns; brown and white rabbits were running about; it was like the Garden of Eden." The children's interest in the trees and plants which they find in the country is greatly stimulated by the study of nature, which forms an essential part of the school, and the teachers themselves are able to make their teaching in this subject more effective by attending the special lectures given for the purpose by Dr. Weiss, Professor of Botany in the University.

The school is growing fast. It now has accommodation for 140 children, having just been doubled in size by the throwing in of the adjoining house. Professor Rein of Jena, on the occasion of the opening of the new wing, gave an address on the importance of demonstration schools of the kind in connection with the work of the universities in training teachers. At present there are over 100 children on the books. Less than half of these are boys. Most of the children are from the neighbourhood, but a few come from a greater distance. The children pay a shilling or eighteenpence a week, according to their age. These school fees are readily paid. The attendance is good. The announcement of a holiday causes lamentations. One of the parents comically complains that she will have to move nearer the school, as her little girl insists on being brought in all weathers.

One of the happiest features in the school is the active corporate life which has been engendered among the children. The "school meeting" is as real an institution as is the "town meeting" in New England. The school captain, a girl of twelve, and the school monitors

On a School Journey: A Halt on the Moors.

were elected by the children themselves. The Games Committee was also appointed at a school meeting, and the Minute Book shows how seriously the proceedings are taken. One entry reads as follows :—

"On October 9th there was a Public School Meeting to elect a Captain of the School, and other various matters.

"Phyllis Hartsorn was elected Captain with 32 votes.

"Elsie Cartwright was elected a member of the Games Committee from Class VII. with 6 votes. Edith Lewins and Edwin Rose were elected members of the same Committee from Class V."

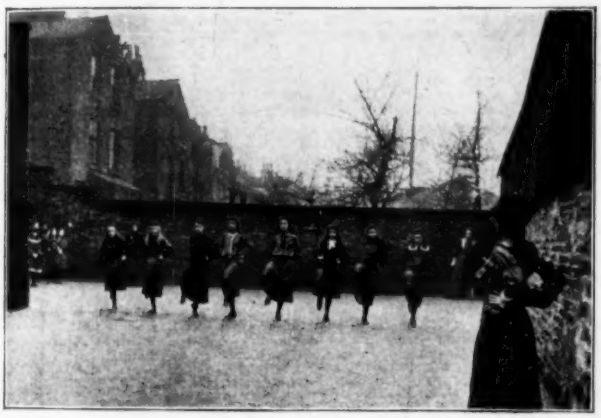
* * * * *

"HYMNS CHOSEN FOR THE YEAR.

"Hushed was the Evening Hour."
"Angel Voices ever Singing."

"GAMES SUGGESTED.

"Prisoners' Base, Staggy, Rounders, Skipping, Puss in the Corner, Sir Roger de Coverley, Drop the Handkerchief, Hide the Thimble, Fox and Geese, Hunt the Slipper, I've been to Paris, Hide and Seek, Red Wolf, Hare and Hounds, Cat and Mouse, In and out of the Window, Family Coach, Three Labourers, I'm on the Miller's Ground, Spinning the Trencher, Musical Chairs, Charades, There was a Jolly Miller, Twos and Threes, Bingo, Nuts in May (two different tones), and the Queen's Piano."



PHYSICAL EXERCISES IN THE PLAYGROUND.

Then follow lists of those actually chosen, and the minutes end with an entry about caps :—

"The caps have been decided on as green, with a white and red badge of some kind."

And thus the children learn almost unawares not a few of the fundamental duties of citizenship.

"The world for gain and giving,
The game for man and boy,
The life that joys in living,
The faith that lives in joy."

KING'S SCHOLARSHIP SYLLABUS, 1905.—We have received a notice from the Board of Education stating that Shakespeare's *Henry V.* may be taken as an alternative to *Much Ado about Nothing.*

OUR MODEL INFANT SCHOOLS.

XXI.—DUNARD INFANT SCHOOL, GLASGOW.

(Continued.)

THE number of children is 463, and they are divided into seven classes, consisting of two stages—the kindergarten stage and the transition stage. In the former stage, the children are trained by contact with actual things rather than words or books. Much reliance is placed on what the children actually do. The lessons are brief and conversational, with intervals for games, songs, recitations, stories, and appropriate exercises and occupations. In the subsequent stage, lessons become somewhat more formal, in view of the fate that awaits all pupils in a primary school.

The kindergarten pupils are dismissed half an hour earlier than the others, leaving their teachers free to help in such work of the upper classes as can only be well done with small numbers in a class. As to hand-work, it should be mentioned that Miss Campbell is no friend to the orthodox sewing as an infant school subject, and hopes for the time when some one will reform and vivify this subject, as has already been done with drawing. The question arises, Can this be done? One may be permitted to doubt it. There is a time for everything, but assuredly the time for sewing is not the infant school period.

As to her professional training, Miss Campbell was a pupil teacher for four years in the Highland Society Schools, Glasgow, and a student (first class and bursar) of Dundas Vale Training College. She was trained in Froebelian methods by Madame Snell, late Principal of Manchester Kindergarten Training College, Examiner in Kindergarten and Geometry to the Froebel Society, and author of *Reading Made Easy*, and *Geometrical Instruction through Hand and Eye*. Among her other qualifications, Miss Campbell holds first-class certificates in Latin, French, botany, magnetism, and electricity, singing, drawing, kindergarten, varied occupations, and physical and musical drill. She received the degree of Fellow of the Educational Institute of Scotland in 1901.

The reports of H.M. Inspectors on this school form a study in complimentary epithets, and each succeeding inspector finds his task more difficult in recording his opinion without plagiarising the superlatives already entered in the Log Book. We cull a few stray blossoms from a whole garden full of the like :—"Praiseworthy tact and skill...conspicuous success."—"Progressive and suggestive educational work on scientific lines... a pioneer in the field."—"Truly admirable...every corner burns with cheerful industry...a beautiful example of scientific method...Impossible to speak of these classes except in terms of warmest admiration."—"Difficult to speak in terms of too warm commendation. Exceptionally able, zealous, and resourceful guidance...fullest and best developments of infant school work...Inspection of these classes quite a pleasure."—"Enthusiasm tempered by tact and common sense... Where all is excellent, it is difficult to select for special praise." And finally, the last report gives up the hopeless task of finding new and yet adequate terms of description, for it opens thus :—"Eulogy of this department is superfluous, my predecessors having exhausted in its praise the vocabulary of admiration."

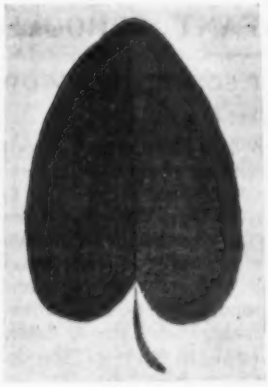


Fig. 14.

Fig. 15.

Fig. 16.

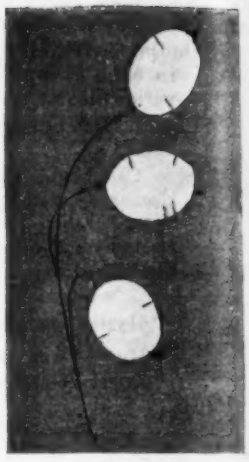


Fig. 19.

Fig. 17.

Fig. 18.

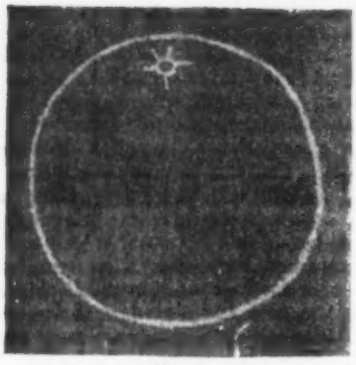


Fig. 20.

Nature Drawing.

Fig. 14, Leaf in water colour (also drawn in chalk). Fig. 15, Drawn from nature (third highest class). Fig. 16, Exercise in brush strokes (highest class). Fig. 17, Mass drawing, brushwork. Fig. 18, Pea grown in school, drawn in water colour (also modelled and drawn in chalk). Fig. 19, Correlation of freearm drawing, brush drawing, and nature lesson (second highest class). Fig. 20, Freearm drawing by child of five.

H.M. Inspectors are not usually "impressionists," but we defy any one, however critical—provided he knows the elements of education—to describe the work of Miss Campbell except in such terms as these.

Despite all this praise, Miss Campbell disclaims any exceptional merit in herself. She says that she has been extremely fortunate in the head-masters under whom she has served, and also in having a most loyal and able staff under her. Of course, she will always enjoy this kind of good fortune. It is the incapable workman who always finds his tools bad. We have known many teachers, but we cannot imagine any one being brought into close contact with Miss Campbell without developing a sympathy and enthusiasm which would ensure success in her own share of the work. At the same time, be the reason what it may, our brief visit was sufficient to convince us of the truth of Miss Campbell's remark—each member of her staff well deserves a share of the praise which the department as a whole has earned, and we have no doubt that among their number Glasgow will find several admirable headmistresses for its infant schools.

Scheme of Work—Two Years' Course.

Children who come to school under five years begin at A in Section A, and remain three years in the department. Those who come at five years or over begin at B in Section A, and remain two years in the department.

Section A. *Three Classes.*	Section B. *Two Classes.*	Section C. *Two Classes.*
1. Stories. 2. Pictures. 3. Games. 4. Modelling. 5. Block Letters. 6. Printing. C. 1. Word Building. 2. Easy Reading Book. 3. Vocal Gymnastics.		
Reading.		
A. Reproduction of conversation by— 1. Modelling. 2. Drawing. B. Letters, their powers and forms taught by—	A. Word Building. B. Reading Books. C. Vocal Gymnastics.	A. Word Building. B. Reading Books. C. Vocal Gymnastics.
Writing.		
1. Pencil Drill. 2. Simple Course of Drawing. 3. Printing letters from blackboard and dictation. 4. Transcription from printed characters.	1. Pencil Drill. 2. Reproductions of Word Building. 3. Exercises in printed and script characters. 4. Dictation of words and sentences in printed and script characters.	1. Pencil Drill. 2. Writing of name and address. 3. Copying sentences from blackboard and reading book. 4. Writing sentences from dictation.
Number.		
Taught by— 1. Gift III. 2. Modelling. 3. Stick Laying. 4. Jointed Lath. 5. Bead Threading. 6. Lacing. 7. Pea Laying. 8. Number Pictures.	A. Taught by— 1. Gift III. 2. Stick Laying. 3. Kindergarten Bead 4. Drawing. [Rails. 5. Number Pictures. 6. Easy Problems.	A. Taught by— 1. Kindergarten Bead 2. Ball Frame. [Rails. B. Easy Problems. C. Easy Addition, Subtraction, Multiplication, and Division sums.
Story Telling.		
A. Stories based on everyday incidents, Reading, Number, and Nature Lessons. B. Reproduction of story by Modelling and Drawing.	A. Stories based on everyday incidents, Reading, Number, and Nature Lessons. B. Fairy Tales. C. Reproduction of story by Drawing.	Same as Section B.
Picture Lessons.		
Observation lessons on reading and number pictures, and pictures of everyday incidents.	A. Same as Section A.	Same as Sections A and B.
Games and Drill.		
1. Simple games with singing. 2. Nursery rhymes with actions. 3. Simple marching. 4. Swedish Drill.	1. Ring Drill. 2. Musical Bells.	1. Dumb-bell Drill. 2. Scarf Drill.
Recitation.		
Short interesting recitations.	Short interesting recitations.	Short interesting recitations.
Form and Colour.		
Taught by— 1. Gift I. 2. Gift III. 3. Ball-making. 4. Stick Laying. 5. String Laying.	Taught by— 1. Drawing elliptical and loop forms. 2. Paper Folding. 3. Paper Cutting.	Taught by— 1. Drawing easy natural forms. 2. Clay Modelling. 3. Brush Drawing.

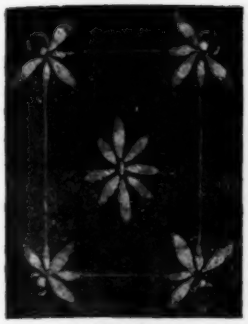


Fig. 21.

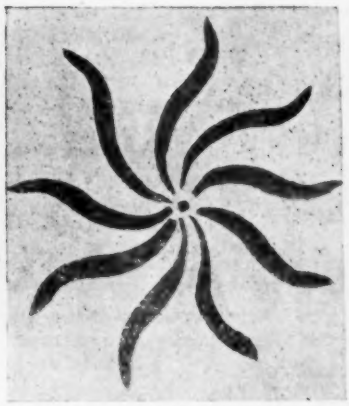


Fig. 22.

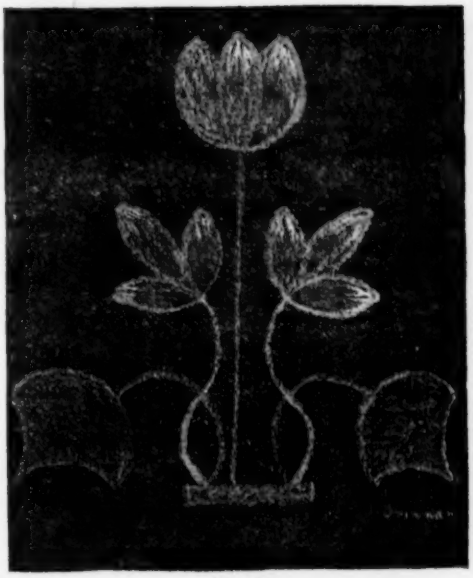


Fig. 23.

Fig. 24.

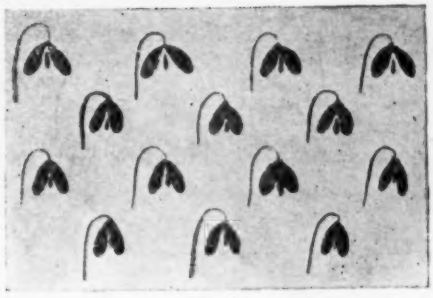


Fig. 25.

Design.

Fig. 21, Brush exercise in "blob," line, and dot. Fig. 22, Brush strokes (highest class). Fig. 23, Chalk design (third highest class). Fig. 24, Design from the apple form (apple previously subject of conversation lesson, modelling, freearm drawing, and mass drawing). Fig. 25, Snowdrop design (flower previously drawn and modelled).

Section A. *Three Classes.*	Section B. *Two Classes.*	Section C. *Two Classes.*
6. Bead Laying.	4. Clay Modelling.	
7. Weaving.	5. Brush Drawing.	4. Harmonious arrangement of colours.
8. Drawing circular forms.	6. Ring Laying.	
9. Rope Ravelling.	7. Picking out and matching primary and secondary colours.	
10. Picking out & matching primary colours.		
Object and Nature Lessons.		
1. Familiar objects of schoolroom.	1. Lessons on colour.	1. Lessons on colour.
2. Familiar animals.	2. Lessons on plants	2. Lessons on plants.
3. Conversation and observation lessons on plants grown in schoolroom.	3. Lessons about animals.	3. Lessons on insects.
	4. Lessons on common things.	4. Lessons on common things.
	5. Natural phenomena.	5. Natural phenomena.
	6. Lessons about "Myself."	6. Animals that fly.
Singing.		
Simple action songs.	1. Simple songs with and without actions.	1. Simple songs with and without actions.
	2. Note tests sung to hand signs.	2. Note tests sung to hand signs.
	3. Imitation and modulator exercises.	3. Imitation and modulator exercises.
Needlework.		
	1. Knitting-pin drill.	1. Knitting with short, thick, wooden pins and rug wool.
	2. Needle and thimble drill.	2. Hemming on canvas with large, thick needle and rug wool.
		3. Laying hems on brown paper and white.

Nature Study—Scheme of Work.

First Year.

No formal work done in this division, but plants grown in schoolroom in glasses, damp flannel, sawdust, moss, pots, and boxes form basis of conversation and observation lessons. All such plants tended by the children in turn under the teacher's supervision.

Second Year.

The work gradually becomes formal in this division. Special lessons on—

1. The Uses of Plants.
2. The Parts of a Plant.
3. Roots of Plants.
4. Leaves and Buds.
5. Buds and Flowers.
6. Fruit and Seeds.
7. How Seeds Grow
8. How Seeds are Dispersed.
9. First Flowers of Spring.
10. Flowers of the Meadow.
11. Flowers of Summer.
12. The Fruit.
13. Autumn Leaves.
14. Autumn Berries.

Each child has at least one plant for which it is entirely responsible.

Modelling, brush drawing, freearm drawing, conversation and observation lessons based on plants in schoolroom.

Catalogue of Plants in Children's Garden.

1, *Bromeleid.*—Brought by child; waiting for flower.

2, 7, 13, 18, 36, *Aspidistra.*—Classroom plants; growth observed; No. 36 in flower.

13, 14, *Narcissus.*—In water, grown among pebbles, to prove that earth is not always required.

4, 11, *Chestnut.*—Planted in water; then nut transferred to earth. 4—5/2/'04. 11—8/2/'04.

5, *Marguerites.*—Flower study to illustrate reading lesson; then modelled and drawn.

6, *Evergreen.*—Brought a year ago by child; cut down at end of season; growth in spring studied.

8, 9, *Chestnut and Walnut.*—In water; changes day by day noted; all other unnumbered glasses have nut in them; nut drawn and modelled.

10, *Tulips and Grass.*—Bulbs set in January; Grass sown in April.

13, *Araucaria.*—Brought by child; growth studied.

15, *Mignonette.*—Illustrative of future appearance of seeds recently sown.

16, *Aspidistra.*—Property of child in class; just about to flower.

17, 34, *Apple Seeds.*—Planted 28/12/'03; 25/11/'03; still under observation.

19, *Iris.*—Grown in pot in which apple seeds previously planted; both appear together; drawn and modelled.

20, *Parsley.*—From seed sown 23/12/'04; changes noted.

21, *Grape Seeds.*—First appearance above soil, middle May; growth observed.

22, *Fuchsia.*—Flowered last summer; remained green through winter; class studying spring growth.

23, *Hyacinth.*—One of thirteen grown in classroom by children; growth observed and changes noted.

24, *Jonquil.*—In glass; one of many single bulbs so grown; growth observed; flower drawn and modelled.

25, "*Our Conservatory.*"—Attempt at flower cultivation under glass. Lobelia sown here and in pots; rate of growth in each case noted. After this lesson glass was used for forcing orange and grape seeds.

26, *Carrot Top.*—Grown in water.

27, *Onion.*—In water; one of many so grown by children in classroom and at home. All who could not afford hyacinth encouraged to bring "onion."

28, *Orange Seed.*—Planted 23/12/'03; first appearance of growth, beginning of May '04.

29, 47, *Tiger Lilies.*—Planted 23/12/'03; 12/1/'04; still under observation.

30, *Calceolaria.*—Classroom plant used to illustrate reading lesson.

31, *Narcissus.*—Grown in earth and studied with those grown among pebbles.

32, 42, 35, *Grass.*—Showing one, three, and four weeks' growth respectively.

33, *Nasturtium.*—From seed planted 23/4/'04; still under observation.

37, *Bulbs.*—Narcissus, Iris, and Jonquil grown in box; growth observed.

38, *Daisies.*—Brought to illustrate reading lesson.

39, *Scilla.*—Sown January; growth studied; flower drawn.

40, *Carrot and Potato.*—In earth contrasted with carrot in water (No. 26) and potato on dark shelf.

41, *Apple Seeds.*—In same pot as narcissus bulbs.

43, *Lobelia.*—Growth studied; waiting flower

44, *Wallflower.*—Seed sown 12/2/'04

45, *Beans and Peas.*—Grown in funnel; roots plainly seen between glass and water; leaf drawn and modelled.
46, *Shamrock.*—Grown from sprig brought home at holiday time; growth observed.
48, *Musk.*—To illustrate reading lesson.
49, *Walnut.*—In pot; transferred from glass after root appeared, 5/2/04.
50, *Chestnut.*—Root 5 in., stem 1½ in.; should have been transferred to earth, but kept to illustrate what takes place in earth.
51, *Walnut.*—Like No. 50, kept as illustration of growth of roots.
52, *Nature Study Sheets.*—1. Specimens of nuts mounted. 2. Child's drawing of same. 3. Child's drawing of nuts, 50 and 51.
53, *Nature Study Sheets.*—1. Specimens of bulbs mounted. 2. Child's drawing of same. 3. One of bulb studies.

SUGGESTIONS FOR CARRYING OUT THE OCCUPATIONS IN CONNECTION WITH THE CORRELATED SCHEME.

September, Week I.

Clay Modelling.—First make a thin slab of clay by rolling pieces in the hands and pressing them flat with the thumb, and smoothing the whole by gentle pressure. Have in your hand a natural specimen of an ear of wheat. Draw the children's attention to the particular arrangement of the grain husks on the stem, and lead them to build up a representation of this on the slab. As the parts representing the grain are small, have some water at hand, so that, if necessary, the hands may be moistened, otherwise the clay may become too dry. Sponges, of course, answer the purpose, but these are not always convenient with large classes.

Brush Painting.—With the point of the brush make a thin stroke across the paper for the stem. The ear is represented by simple short blobs (small) placed first on one side and then on the other, following out the alternate arrangement as in the modelling. The leaf is represented by a long-drawn-out brush stroke.

Paper Cutting.—Fold a four-inch square of paper in half, and cut the handle with fold in the centre; then open the paper and cut the outer curve to the point, and return along the inner curve to the handle. It is not possible to represent the tool with perfect accuracy so far as the position of the steel part fixed in the handle is concerned, but it is quite sufficiently shown to be a useful exercise or expression lesson.

Drawing.—This would be done from the teacher's copy on the blackboard.

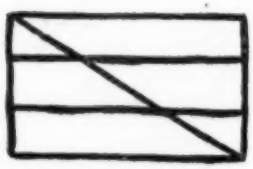
Crayon Colouring.—The outline may be drawn on paper and printed by means of a copier. The children would each be given a copy, which they would fill in with the help of the directions of the teacher. The teacher should have an enlarged drawing on the blackboard.

Stick Laying.—The children place the sticks to represent a gate the teacher either demonstrates from the table or blackboard.

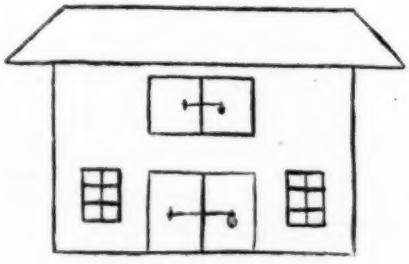
Week I.—Clay Modelling.

Week I.—Brush Painting.

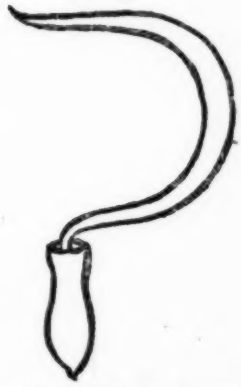
Week I.—Crayon Work.



Week I.—Stick Laying.



Week I.—Free Drawing.



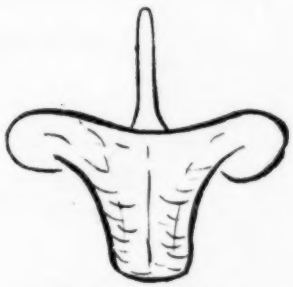
Week I.—Paper Cutting.

WEEK II.—CRAYON WORK.

WEEK II.—BRUSH PAINTING.

WEEK II.—CLAY MODELLING.

WEEK II.—FREE DRAWING.



WEEK II.—PAPER CUTTING.

WEEK II.—STICK LAYING.

Building Gift IV.—Introduce by conversation in connection with the week's work, and build to imitation.

September, Week II.

Clay Modelling.—Make a slab of clay as in the previous lesson, and on this, by observation of a natural specimen, build up or form the poppy head. This is not so difficult as it might appear at first sight, but it must be done quickly or the clay will become too dry.

Brush Painting.—In leading children to execute this, be careful that the point of the brush is used. It is allowable just to indicate by means of *small* dots the rough shape of the top part of the flower. The lower part and the buds will not present any difficulty. The leaves must be as fine as possible.

Crayon Colouring.—Proceed on the same plan as in the previous lesson. Get the children to use fine strokes in all filling-in work.

Paper Cutting.—This object may first be drawn (enlarged) by the children, and then carefully cut out. The best cutting work is the least jagged.

Free Drawing.—May be drawn either with lead pencil on white paper, or for variety on brown paper with crayon or chalk.

Stick Laying.—Ten sticks all the same size are required for this shape of vase, but others of an easier pattern and requiring a less number of sticks may be arranged.

September, Week III.

Clay Modelling.—First make a slab, then model the mouse in the following way. Taking a ball of clay, gently roll between the hands till it is cylindrical in shape, with rounded ends. Roll one end till tolerably pointed, shaped like the head of the mouse. Take small pieces of clay and press flat between the fingers. Upon these mark the toes. Take a small piece and press into the shape of the ear. Bore small holes in the head, and into these insert the ears. Be careful not to let them point forward too much, as this alters the appearance of the animal at once. Roll out a piece of clay for the tail, and insert in the same kind of way—by boring a small hole. Two small black beads for eyes and a few bristles for whiskers would make this a very realistic little model, and should be easy enough for five-year-olds to manage.

Brush Painting.—This exercise in painting will serve as a very good recapitulation lesson for the ear of wheat, with the addition of the small nest of the field mouse.

Crayon Work.—This, like the other examples, should be outlined by means of a copier, and the children would fill in the picture in colour while the teacher demonstrates from a large facsimile on the blackboard.

Paper Cutting.—This may be drawn first and then cut out, or cut without drawing if the children happen to be clever in using the scissors.

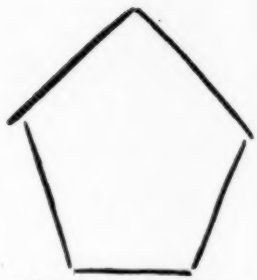
The remaining illustrations do not require any explanation.

September, Week IV.

Clay Modelling.—It may seem superfluous to offer any suggestions for modelling a cottage-loaf, except perhaps

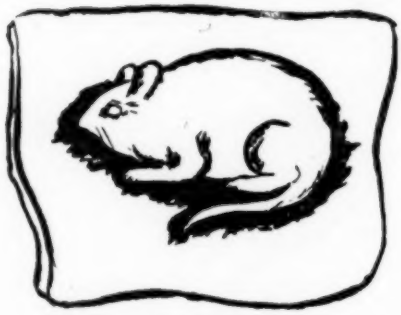
WEEK III.—BRUSH PAINTING.

WEEK III.—FREE DRAWING.



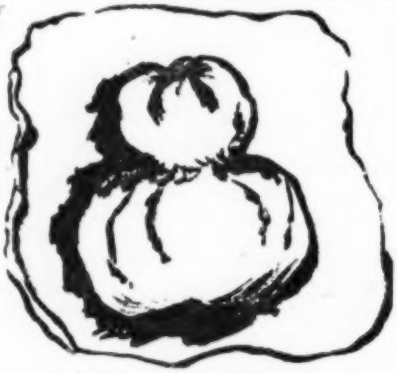
WEEK III.—STICK LAYING.

WEEK III.—PAPER CUTTING.



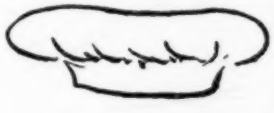
WEEK III.—CLAY MODELLING.

WEEK III.—CRAYON WORK.

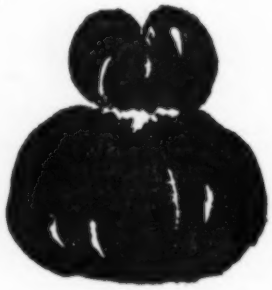


WEEK IV.—CLAY MODELLING.

WEEK IV.—FREE DRAWING.



WEEK IV.—PAPER CUTTING.



WEEK IV.—BRUSH PAINTING.

WEEK IV.—CRAYON WORK.

WEEK IV.—STICK LAYING.

to say that it is *not* represented by two equal-sized balls placed one on the top of another. If a loaf is broken where it naturally divides, it will be seen to be depressed at the top of the lower part. This depression should be represented in the model. It will result in a much more realistic piece of work.

Brush Painting.—This will be a good exercise in washing. Yellow paint with a touch of brown comes out well. Leave some streaks of white where shown on the illustration, or touch these spots with a tinge of brown when the first wash of colour is dry.

Crayon Colouring.—This is a very easy exercise for quite little children, even four-year-olds. Outline by means of the copier, and let the children fill in.

Paper Cutting.—This being symmetrical, can very easily be cut from a piece of paper folded in half. The fold should come in the middle of the cap. Begin to cut at the X marked in the illustration, and follow the lines given. This should be represented by the teacher on the blackboard if the pupils are beginners.

Free Drawing.—This needs no explanation, except to say that, if possible, the children should draw from a model rather than "imitate imitations" on the blackboard.

SINGING IN INFANT SCHOOLS.

BY W. G. M'NAUGHT.

PART I.

TO some persons it may appear that singing in infant schools does not afford much scope for special consideration. A few songs and song-games have to be taught, and there is an end of the matter. But in view of the influence, good or bad, singing may exert upon the future of children, it can be shown that its treatment demands the closest possible consideration on the part of the conscientious teacher. The line of least resistance is to allow children to sing as they will in the schoolroom, and where this freedom is tolerated it is almost invariably the case that a bad tone and style will be instinctively adopted. It is not too much to say that if none but expert skill could be brought to bear upon the singing of little children many thousands of naturally fine voices would be preserved.

The following paragraphs relating to singing, from the revised instructions issued by the Board of Education in 1901, will form convenient texts for remark. These instructions state that some of the objects sought for, in including singing in the school curriculum, are—

"(*a*) To provide a healthful and pleasant form of collective indoor occupation, and, through the words of the songs, a possible moral and educative force. Words, as a rule, are more permanently memorised through music than in any other way.

"(*b*) To train and preserve the voices of children, not only with a view to the attainment of tasteful and agreeable execution during school life, but with a view to the potentialities of the children as adult singers."

The following paragraphs refer directly to infants' singing:—

GRADE I.—INFANTS.

"(*c*) *Voice Delivery.*—It is of the utmost importance that little children should be trained to sing sweetly and without strain. A good pattern and a repression of all loud or harsh singing are the best means of teaching. Children not able to imitate correctly, or to sing in tune with the others, should not be allowed to sing the songs.

"(*d*) *Songs.*—The music for little children need not be commonplace in order to be simple. The value of the words as an action or a game song, or as helping to enforce a lesson, may excuse the use of music that is not of the best; but wherever possible, both music and words should be chosen because they are good. The compass of songs practised should be limited to the power of the class. This will vary according to the skill of the teacher, but it will generally be from about C to D^1 or E^1.

"(*e*) *Musical Knowledge.*—The 'mental effect' of the scale degrees and their association with hand signs and sol-fa names can be easily and pleasantly taught. The degrees constituting the key-chord (*Doh, Me, Soh, Doh*^{1}, or *Soh*$_1$, *Doh, Me, Soh,* according to pitch of the key tone) should be practised in this way. But as a rule, no instruction in written or printed notation need be attempted. The main aim should be to develop the sense of tune and rhythm by the neat execution of songs taught by ear."

Paragraph (*a*) is a statement of general objects with which all concerned will agree. Paragraphs (*b*) and (*c*) deal with matters of the greatest practical importance. The delivery of the voice is placed before everything else, and this is exactly as it should be. But before methods of dealing with children are considered, the qualifications of the teacher must be described.

The musical qualifications necessary to a good infant school teacher are as follows:—

(*a*) A fair voice, not necessarily strong, but clear and well in tune (she should be able, say, to sing a simple school song without flattening). Compass need not be extreme—about from B below the treble staff to E in the fourth space. A higher voice is an advantage, especially if the high notes are *not* strong, but small, sweet, and easily produced. Infants properly taught can sing quite easily higher notes than are usually suggested as the limit of their upward compass.

(*b*) Ability to clearly and smoothly differentiate the common vowels of our language in all parts of the voice. Many vocalists do not trouble about vowel definition. They unconsciously allow a favourite vowel—*aa* or *oo*—to permeate all other vowels. They are "one vowel" singers.

(*c*) Ability to enunciate words with *remarkable* distinctness. In singing, this is a matter of taking special trouble. No infant class teacher is worthy of her position if she will not take this trouble. The influence of distinct enunciation in teaching young children is most marked.

(*d*) Knowledge of the leading principles of good, healthy breathing, and at least fair control over breathing for singing purposes. The apparent contradiction of various methods of breathing recommended may well perplex teachers. But probably there is not so much difference in practice as there seems to be between rival methods authoritatively advocated. In this connection the able, and to the present writer convincing, lectures given by Dr. Hulbert to teachers under the auspices of the London School Board may be mentioned. They are published in a cheap form in Novello's Primer Series, under the title of "Breathing for Voice Production."

(*e*) Ability to sing easy music at sight, or at least sufficient knowledge of musical notation to be quick in learning new tunes accurately. The Elementary Tonic Sol-fa Certificate and the First Grade Staff

Notation Certificate, issued by the Tonic Sol-fa College, are satisfactory miminum requirements.

(*f*) Ability to sing a children's song tunefully and rhythmically, and with the necessary point and expression. If a number of songs have been committed to memory, it will be a great advantage.

(*g*) Ability to play quietly a simple pianoforte accompaniment is extremely useful. An accompaniment is indispensable to action songs. Little children's voices almost always need the support of an instrument. Singing cannot very well be continuous. Pianoforte interludes fill up gaps in an interesting way, while children are resting their voices. But pianoforte thumping is worse than the entire absence of an instrument.

The list is a fairly long one, but it may be hoped it is not too formidable. Certainly if a teacher is not competent, children may be deprived of their rights.

Practical work in the infant class will now be discussed.

Care of Infants' Voices.

It is unreasonable to expect much tone from young children. All urging to "sing out" is likely to do harm. A soft, clear, sweet tone produced without effort is the ideal. This perfection may not be easy to get, but at least this goal should be the object of patient practice. Enthusiastic infants (probably the best natural singers in the class) *try to hear their own voices* in the combined singing, and instinctively press the breath hard against their vocal cords, pinch the back of the throat, keep the mouth narrow, and squeeze out a shrill, raspy tone which penetrates through the mass, and in the end leaves the child vocally exhausted and unable to sing in tune. The same children, if asked to sing individually, will probably adopt quite a different and pleasant quality of tone—unless, indeed, the bad collective singing habit has become confirmed. Probably this painful manner of voice delivery is partly acquired by the practice of simultaneous reading, or in saying tables, etc., wherein it is too often supposed that tone and style are of no consequence. As a rule, the simultaneous reading is recited on too low a note, and conventional inflections are tolerated, if they are not cultivated. It would be less harmful, in instilling bad habits in vocal production, if recitations were practised on fairly high pitches, allowing only one pitch to be used—that is, there should be no rise or fall at the end of a sentence. The whole performance should be *treated as singing* gently delivered. Obviously it is of little use to cultivate a beautiful tone in the singing class if quite another kind of tone is tolerated in other vocal work.

It must be ever remembered that a large part of the teaching of voice production is the training of the ear of the pupil. The imitative instinct is strong. If the proper sort of tone is presented to children's ears they will most probably adopt the right physical means in endeavouring to reproduce what they hear. The importance of the sweet-toned pattern cannot be overestimated. One of the first tasks of a teacher should be to find out which children have pleasant voices, and then to use them to pattern. Children can imitate one another's voices more easily than they can an adult teacher's voice. The mannerisms of tone fallen into in schools are a curious exemplification of this instinct of imitation. You hear the same peculiar twang of tone in a school year after year, although generations of children have passed through the class. This fact emphasises the necessity of establishing a good habit of voice delivery. It may cost a year's patient work to get rid of bad tone and to establish a good tone, but after that the task will be comparatively easy.

(*To be continued.*)

RECITATIONS FOR INFANT SCHOOLS.

DUMB FRIENDS.

THE horse says "*Neigh*," but he doesn't mean "No;"
If he only could speak he'd tell you so.
He'll tug and strain at the heavy cart,
And do his work with a willing heart;
But you, in your turn, must do *your* part,
And treat him well.

The cow says "*Moo!*" and she means to say,
"I'll give you my very best milk each day;
I'll chew my cud with the greatest care,
And my butter and cheese will make you declare
They're the best in the land. So, pray do your share,
And treat me well."

"*Ba, ba!*" says the sheep, and by that we know
She's trying to make her best wool grow,
That when the shearing time comes round,
Her fleece will be long, and silky, and sound.
She does this for you, and so you are bound
To treat her well.

So let us be kind to the animals all
Who live in the field, the farmyard, and stall;
For they are our friends, our helpers too—
They willingly work for us all the year through.
Let us never forget to give them their due,
And treat them well.

E. S.

THE GOOD SHEPHERD.

THE sun sinks in the golden west,
The wind is rising on the wold,
The weary sheep now seek their rest
Within the fold.

Beneath the watchful shepherd's eye,
All day in pastures sweet they roam;
When twilight comes, and night is nigh,
He leads them home.

He keeps them safe from every snare,
That none may stray and none may fall;
He tends them with a father's care,
And loves them all.

And see! a lamb so weak and cold,
Its little feet tired out with play,
Is carried gently to the fold
At close of day.

And you're a little lamb, my love,
A tender lamb among the sheep;
And you've a Shepherd up above,
Your life to keep—

To watch you when the joy bells ring,
To shield you in the coldest blast,
To keep you safe, and gently bring
You home at last.

E. S.

Our Modern Language Section

ON THE STUDY OF GERMAN.

III.

THE student who wishes to acquire facility in speaking German must be prepared for some amount of drudgery and for some regular drill in terminations. The subjects of this drill will be mainly—

1. The *noun*, its case endings, gender, and plural.
2. The *adjective*, paying special attention to the different forms it assumes according as it is preceded by a *determinative* adjective, a *possessive* adjective, or by neither of these.
3. The *verb*.

We have already dealt with the first of these headings. Coming to the second, we have to distinguish between the *attributive* and the *predicative* use of the adjective. It is used attributively when it precedes its noun, and predicatively when it follows it and is joined to it by the verb "to be" or a verb of the same type. In the second use it does not vary in form. Thus while we say, "Der *kleine* Mann ist hier;" "Hier sind *kleine* Fische;" "Ich gab das Buch dem *kleinen* Kind," we say, "Der Mann ist *klein;*" "Die Fische sind *klein;*" "Das Buch ist *klein*."

The three forms the adjective assumes are—

1. The form following *der*, or the determinatives *dieser*, etc. This may be easily remembered as the form following the *er's*, as all the words which require this form after them, with the exception of *derselbe*, end in *er*. *Derselbe* is only an apparent exception, as it is a compound of *der* and *selbe*.
2. The form following the *ein's*, as *ein*, *kein*, *mein*, etc.
3. The form when the adjective is not preceded by one of either of these classes of words.

The difficulties of the German verb must not be underrated, but they are of different character from those which one has to face in the study of French. As in our own language, so in German, the verb has two conjugations, a weak and a strong, and there are few terminations to learn. In the weak conjugation the preterite is formed by the addition of *te*, and in the strong conjugation by a modification of the vowel sound. Nor does the formation of the past participle by the addition of the prefix *ge* strike the educated Englishman as at all unfamiliar. A further point of contact between the two languages is afforded by the abundant use of auxiliaries in each. Leaving for distinct treatment the question of the separable verbs, there are three clear points of contrast between the two languages—

(*a*) The full conjugation of the subjunctive in German.
(*b*) The rules for the compounding and use of auxiliaries.
(*c*) The formation of the passive voice with *werden*.

With regard to (*b*), the student will at first find some difficulty with the order of the respective auxiliaries; but even at the risk of incurring the charge of dullness, we strongly recommend him to go in for constant drill. We have tried it ourselves, and can testify to its value in fixing the order of the parts of the compound verb. A further help is afforded by the fact that in a *simple* sentence the final word is an infinitive or a past participle.

We shall not attempt here to go into the niceties in the uses of the auxiliaries *dürfen*, *mögen*, *sollen*, and their various tenses, but merely enjoin the student to give these his closest attention.

If we have insisted on the necessity for courageously facing the heavy drudgery of mastering the accidence of German, we must not be understood to mean that the intelligence and the reason are not likewise to have a share in the assimilation of the peculiarities of the language. In our own case we had the advantage of knowing Italian before we took up the study of German, and when we came to the use of *sein* (to be) as the auxiliary for the compound tenses of itself, and the use of *werden* (to become) as the auxiliary for the passive voice, we felt quite at home. *Ich bin gewesen* found its parallel in *Io sono stato*, and *Ich werde getrübt* in *Che viene fatto?* So also when we got to the separable verbs, memories of many a line in Homer flitted across our minds, and it was a delight to us to find that the same mental process which made the Greek separate his prefix and verb by a long gap showed its working also in the case of a class of verbs more fully organised in German than perhaps in any other language.

(*To be continued.*)

DIFFICULTIES OF FRENCH IDIOMS AND CONSTRUCTIONS.

X.

JUST as in the study of a period of history the distinctive characteristics of an era must be firmly fixed in the mind, so in the study of a language the peculiarities of accidence and syntax which differentiate it from other languages, and particularly from the native language of the student, must be clearly grasped by the pupil.

In our early study of English grammar many of us have distinct recollections of the difficulty we experienced in distinguishing between the use of a word as an adverb and as a preposition. It was pointed out to us that as a preposition the word could only be shifted in position when the whole phrase it introduced was shifted, whereas as an adverb it could be shifted without of necessity altering the order of other words in the sentence. This test could not be applied to French, for in that language the place of the adverb is practically invariable. The simple adverb, unless it is of an interrogative nature, usually comes next the verb, or, in a compound tense, between the auxiliary and the past participle. Interrogative adverbs, as in English, come first in the sentence. If a simple adverb, or adverbial phrase which is not of an interrogative nature, comes first, it is for the sake of emphasis, but in this case subject and predicate are inverted in order. These are, of course, only broad rules embracing the main points of difference between the two languages.

The usages connected with prepositions offer no very striking points of contrast between the two languages, with the exception that, as a rule, the preposition should be repeated, and not understood, before each noun to which it refers. This is particularly the case with the prepositions *à*, *en*, and *de*.

One of the chief points of difference between conjunctions in French and in English consists in the fact that in French the preposition cannot, as in English, be used as a conjunction without the addition of *que*. The student of Latin will find less difficulty with this point than will the man who knows no Latin. He will remember that *ante* = before, and *post* = after, but that the corresponding conjunctions are *antequam* and *postquam*. So in French a word which is primarily a preposition cannot be used unchanged as a conjunction. In this use *que* must be added. Thus while the prepositions are *avant* (before), *après* (after), and *pendant* (during), the corresponding conjunctions are *avant que*, *après*

que, and *pendant que*. It must also be remembered that many of these forms are followed by the subjunctive.

(*To be continued.*)

FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than Sept. 8**, and addressed:—PRIZE EDITOR, Office of the *Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

On ne saurait trop vanter la gaîté espagnole ; elle est un défi de l'homme à la destinée, une victoire de l'esprit sur les choses, un miracle, un don de la grâce. Qu'on y pense, une gaîté qui a résisté à trois siècles du régime le plus oppressif qu'ait jamais subi aucun peuple européen ! une gaîté qui a traversé l'inquisition, l'ombre et le silence de Philippe II. ! Cette belle humeur qui résiste à tout vit de peu ; elle ne réclame que de médiocres frais d'établissement, elle se suffit à elle-même. "Quel homme singulier tu fais !" s'écrie dans une pièce d'Alarcon un valet parlant à son maître. "Tu ne bois pas au cabaret, et pourtant tu t'y amuses ; tes yeux, seigneur, versent la joie." Ils abondent dans la Péninsule, ces yeux qui versent la joie ; elle a inventé le bonheur économique, qui se compose de soleil, d'oisiveté, de causeries, d'airs de guitare, de gazettes à un sou, de cigarettes à un liard, d'un peu de merluche, de beaucoup de verres d'eau et de l'espérance de voir tuer, le dimanche qui va venir, six taureaux bien encornés. La capitale de l'Espagne est pleine de gens qui sont contents parce qu'ils veulent l'être ; aussi le proverbe dit que la parfaite félicité est de vivre aux bords du Manzanarès, et que le second degré est d'être logé au paradis, pourvu qu'il y ait là-haut un judas pour voir Madrid. Non, ce n'est pas s'aventurer que de prétendre qu'en dépit des Carlistes, des pétroleurs, de tout le sang versé et du coupon qui ne se paye pas, il y a dans l'Espagne d'aujourd'hui, telle qu'elle est, plus de gens contents, plus de vrai bonheur que dans la Prusse, le plus gouverné des pays, ou dans l'industrieuse et opulente Angleterre. VICTOR CHERBULIEZ.

RESULT OF THE JULY COMPETITION.

The prize is awarded to "C.E.M." (Will C.E.M. kindly forward name and address for publication?)

First Class.—Eicarg, Oakover, Fitzthomas, Hollandais, Traduzco, Racine, Agaznog, Tyro, Rada, C.S., Judy, Stanislaus, Jumbo, Dargle, Spes unica, E.S.I.A., Phyllis, Bella Speranza, Gawayn, La Printanière, Qui vive, Woodlands, Ignoramus, R.U.I., Jane, W.M.E., Guinevere, Erin-go-bragh (A), Hope, Adlitam, Amiechen, Periwinkle, Chibil, Très difficile, Me, Llecan, Bracebridge, Bassenthwaite, Grimbarian, Tulipa nigra, Clio, N.H., Day Dawn, Trossachs, Meriden, Gabrielle, Bam, Jadie, Erin-go-bragh (B), Welburn, Cœur-de-lion, D'Arcy, C.C.F., Bell Heather.

Second Class.—Klopstock, Kismet, A.P.T., G.H.W., Iolanthe, Dulce, Arran, Gradire, Lychnis, Dewdrop, Chamonix, Pansy, Excelsior, Brân y Nos, Daisy, Alexandrine, Putte, Killarney, Odd number.

Report.

There is only a small number of really good translations. Excessive literalness is becoming less and less a fault of the translations sent in, but still there is too much of it. *Pas de deux burlesques* troubled a few, who coupled *deux* with *burlesques*, instead of making the latter word an adjective relating to *pas*. *Aire* was translated by some in its literal sense of "thrashing floor," whilst others rendered *pour laisser l'aire libre aux danseurs* as "to give free air to the dancers."

A correspondent asks as to the origin of the term *petit bleu*. It is merely derived from the colour of the paper used for the telegram form.

Prize Translation.

The Kermess of Putte, which every year attracts the entire Polder, is an orgy of which nothing can give an idea. In the forenoon the highroad leading from Cappelle to the Dutch frontier is crammed with vehicles piled to overflowing, and bumping over the uneven surface, with their loads of men in beribboned straw hats and women in gaudy finery, all packed together in a jumble of ruddy faces, merry and mischievous. Sometimes the cart stops at a tavern, and they all alight to quench their thirst with bitter beer, while the horses stand still, puffing and blowing. Then, taking each other's hands, they dance in a ring, or jump up and down, often continuing the exercise after getting back into the vehicle. On the road couples or groups, waifs and strays of the crowd, catch the contagion of the passing merriment, and in their turn take to dancing sarabands and cutting capers, or indulge in ridiculous antics, arms and legs being raised as high as possible. A frenzy for rotating seems to seize the steadiest persons directly they enter the great whirlpool of the Kermess ; you see them gyrating with a solemn air, their sober faces like those of men accomplishing a task. What with smockfrocks waving in the wind, and ribbons flapping to the breeze, the whole countryside appears to be clapping its wings preparatory to taking flight. But this is merely the prelude. From the line of drinking shops under the trees by the roadside resounds a thunder and bellow of barrel-organs, with handles wildly turned by men in shirt sleeves. Each has its instrument in a corner, its chairs, tables, and stove being dislodged to leave a free space for dancing. C.E.M.

BRUSH DRAWING SUPPLEMENT.

THE various exhibitions of school work show that brush drawing is rapidly gaining favour as an integral part of the drawing schemes in elementary schools. The character of the work, too, is changing, and undoubtedly for the better. The work is no longer confined solely to making blobs and conventional strokes, but drawing from nature is taking a rightful and important place in the scheme. The training gained by making neat and shapely brush impressions in the very earliest stages, and in producing the free, graceful conventional brush strokes later, is not by any means to be despised; but it is only a portion of the work.

The Supplement endeavours to show how simple leaf forms may be drawn from nature and adapted to pattern. Unfortunately, in this instance the reproduction is poor, and gives but little suggestion of *brush drawing*. Perhaps, however, these will serve as suggestions, and we will give another sheet with an early number correcting the defects of this.

Various methods may be employed, but in all cases we must go to nature first. For example, Fig. 1 is a reproduction of a natural laburnum leaf. Fig. 1*a* is a direct brush drawing of this in mass, without any previous pencil outline. Fig. 7 is the reproduction of a natural leaf of the flowering ivy. Fig. 7*a* was first drawn carefully with pencil (outline and veins), and then lightly tinted with colour. This method allows us to show more detail. Figs. 4, 6, 10, 13, and 15 are other natural leaves, and Figs. 4*a*, 6*a*, 10*a*, 15*a*, and 15*b* show various methods of drawing them. None of these reproductions are quite satisfactory, but they may serve as suggestions. The examples are all simple in character, and should be well within the capacity of scholars in the junior division of a school.

The adaptations to pattern explain themselves. The geometrical spaces should first be set out with a ruler to the dimensions suggested. Afterwards the disposition of the leading lines and principal masses may be *very lightly* indicated with the pencil, and then drawn freely with the brush in strong but pleasant colour. Avoid the use of thick, pasty colour. Let it flow freely from the brush. The slight irregularity of tone is rather an advantage than otherwise. A tinted "ground" will often improve the appearance of the pattern.

After copying or even seeing some of these patterns, the scholars should be encouraged to make original arrangements of these or similar leaves. This is a point that cannot be too strongly insisted upon. Self-effort and self-development should be fostered to the fullest extent.

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BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP COURSE FOR DECEMBER 1904.
Ninth Month—September.

Work to be Prepared.

1. *Reading and Repetition.*—Regular daily practice for those who have not been examined.

2. *Teaching.*—The teaching of geography. Chap. ix., *Scholarship School Management.* Geography is one of the most useful of school subjects, and one which is always popular with children if it is well taught. Apart from its practical utility, it affords many opportunities for the development of the faculties—memory, imagination, observation, reasoning, and judgment. Its practical bearing is most important to a nation like ours, which depends for its position on geographical knowledge and intercourse with other nations. To find markets for manufactured goods, to obtain supplies of raw materials at the lowest rate, to know the quickest and cheapest routes by which goods may be imported and exported, are essentials to our national prosperity.

The chief difficulty in the teaching of the subject is the overwhelming array of facts with which one is confronted, and the inevitable danger that these facts may be confused if they are imperfectly taught. Clearness of ideas and definiteness of knowledge are the first essentials to be aimed at. Everything depends upon the teacher; the subject is fascinating, the class is willing to learn if only the facts are presented in a proper manner.

The earlier lessons should be given on the geography of the district in which the child lives, not as mere lists of dry facts, but as problems for solution—the natural features of the place, its climate, the natural productions and what becomes of them, the local manufactures, mode of government, towns, etc. When the district has been exhausted, then excursions may be made farther afield, but always, if possible, linking what is already known to what is to be acquired. The reasons for everything must be educed: why does one country produce more food stuffs than it needs, while another produces less? why is one climate mild and equable when another is one of extremes? why do towns spring up in certain places and not in others? what are the effects of climate on productions and mankind? Some association of ideas must be found for all new facts, and it is in this linking together that a good teacher shows skill.

It is hardly possible to overestimate the value of map drawing as an aid to geography. Wall maps should rarely be used. The teacher must draw on the blackboard, the class must copy. Only the names to be remembered should be inserted, and the maps should be repeated till they can be produced from memory with a fair amount of correctness. Mapping, description, reasoning, pictures together cause the lesson to be looked forward to with delight.

3. *Drawing.*—One or two copies each week from the flat or from nature. Rapid easy sketching, good proportion, smooth curves are to be aimed at. The careful study of a growing plant or group of flowers is of greater assistance than the mechanical copying of a conventional design.

4. *Music.*—The common musical terms. Note particularly the difference between terms relating to time and expression. It may seem unnecessary to give this warning, but one continually meets with *rallentando* explained as "softer and softer," or *diminuendo* as "softer." The modifying adverbs must also be learnt—non, molto, più, etc.

The following terms have been asked for:—Syncopation, allegretto, legato, diminuendo, largo, andante, pianissimo, crescendo, adagio, lento, accelerando, ritardando, staccato, mezzo piano, forte, rallentando, dolce, dal segno, sforzando, ad libitum, a tempo, da capo, leggiero, presto, M. 80, poco mosso, meno mosso, maestoso, sostenuto, con brio, sempre, con moto, transition, larghetto, fine, bridge note, ♩. = M. 100.

5. *Penmanship.*—Ten minutes' daily practice, and care at all times.

6. *Composition.*—Write one or two essays each week on such subjects as:—

(*a*) Free trade and protection.
(*b*) Mountain scenery.
(*c*) "The child is father of the man."
(*d*) The use and abuse of riches.
(*e*) Instances of remarkable intelligence in domestic animals.
(*f*) Effects of wealth on the character of a nation.
(*g*) The decoration of houses.
(*h*) Summer in the country.

Read up the subject, if necessary. Prepare a skeleton plan, and having written your essay roughly, polish the sentences till they are your very best.

(*a*) This subject will probably need some preparation. Protection—that is, putting import duties on articles imported—is adopted more or less by all countries except England. It increases the revenue of the country, but puts up the price of the commodity.

(*c*) It is generally, but not always, possible to predict what the man will be like from the habits and bias of the child. Like all rules, it has exceptions, and the dull boy may become the talented man, and *vice versa*.

(*d*) Define "riches," and show that wealth entails responsibilities, which, if recognised and acted up to, enable the owner to do great good to others. If they are not recognised, and if wealth is spent in fostering vicious and sensuous habits, then it is abused.

(*f*) The general effect of wealth on a country is to cause a deterioration of the higher qualities. The pursuit of wealth, by fair means or foul, becomes the engrossing pursuit of all, and the national character rapidly degenerates. This has been the case historically—for example, the Roman Empire, France, etc. It is to be hoped that it may not be so with us, although there are many indications that it is quite a possibility.

(*g*) The effects of surroundings upon the mind and health are nowadays recognised by the majority of educated people, but are matters of indifference to the poor. Cleanliness and light are absolute essentials, and bright cheerful colours, artistic pictures, and furniture are little less so.

7. *English.*—

(*a*) Twenty-five roots and meanings per week.
(*b*) *Much Ado about Nothing*, Act v., Scene 1., lines 1–160.
(*c*) The rules of punctuation.
(*d*) Victorian literature.
(*e*) Prepare answers, if necessary, to the following paper (set at Scholarship):—

(1.) Define a relative pronoun. What is the rule (*a*) for its number, (*b*) for its case? Illustrate your answer by quotations from the play. Can you give any rule for the use of *that* instead of *who* or *which*?

(2.) Write sentences showing the use of each of the following words as (*a*) an adverb, (*b*) a preposition, (*c*) a conjunction:—*after, before, since.*

(3.) Explain the force of the termination *ing* in the following sentences:—

He is building a new house.
The new house is a-building.
He is tired of building houses.

How do you parse the word *building* in each case?

(4.) Give the origin and meaning of the following prefixes and suffixes:—

(*a*) Prefixes—*a*, in away, aware, ago.
for, in forsake, forlorn, forgive.
un, in uncouth, unto, undo.
(*b*) Suffixes—*ment*, in improvement, parliament.
some, in handsome, wholesome.
ster, in spinster, maltster.

(5.) Distinguish between a compound and a complex sentence.

Mr. H. J.

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What are the appropriate connecting particles of the component members of each kind of sentence?

(6.) Write in your own words the meaning of the following passage, and explain any expressions which appear to you to be obsolete. What ellipsis follows "superior"?

"Revenge is a kind of wild justice, which the more men's nature runs to the more ought law to weed it out. For as for the first wrong, it doth but offend the law, but the revenge of that wrong putteth the law out of office. Certainly in taking revenge a man is but even with his enemy; but in passing it by he is superior, for it is a prince's part to pardon."

(7.) Mention four of the most celebrated authors of the eighteenth century, and give an account of the works of one of them.

8. *Geography.*—(1) Revise the geography of the United States and Mexico; (2) revise the geography of New Zealand. The United States consist of the thirteen original states:—New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, together with thirty-two states admitted since, five organised territories—New Mexico, Arizona, Alaska, Indian Territory, and the District of Columbia—and two unorganised territories—Oklahoma and Hawaii. Each state has a legislature of its own, but the territories are governed from Washington. Having an area of 3,622,933 square miles, a population of eighty millions, and unbounded natural wealth, the United States form one of the most powerful nations on earth.

Note the four natural divisions of the country—(*a*) the Atlantic slope; (*b*) the Great Central Plain; (*c*) the plateau between the Rockies and the Coast Ranges; and (*d*) the Pacific slope.

The climate and productions of each are special.

The great manufacturing towns are very important. Draw sketch maps, and put the towns in the correct place, repeating till thoroughly known.

The government requires particular notice, especially in view of the presidential election.

The method of electing a president is as follows:—Each state elects or appoints a number of electors equal to the whole number of senators and representatives to which the state is entitled by Congress. The "College of Electors" meet on a certain day at their capitals, and vote for a president by ballot. The ballots are then sent to Washington, and opened by the president of the Senate in the presence of Congress, and the candidate who has received a majority of votes is declared president. The office is held for four years. The government consists of—

(*a*) The President.

(*b*) The Senate, consisting of two senators from each state elected for a period of six years, the total number being 90.

(*c*) The House of Representatives, chosen by each state for two years. The number varies with the population. At present there are 357.

Another point of importance in the geography of the United States is the territorial expansion during recent years, the Monroe Doctrine having been partly set on one side. In 1898 Hawaii (cap. Honolulu) was annexed. In 1899, by the Anglo-German agreement, several of the Samoan islands were acquired. In 1898 the island of Puerto Rico was captured; cap. San Juan. In the same war also the Philippine Islands were acquired; cap. Manilla. Guam, the largest island of the Ladrone (or Marianne) group (cap. Agana) was also taken from Spain.

The questions usually set on the States bear especially on—

(*a*) The position and importance of the chief towns.

(*b*) The productions.

(*c*) The Atlantic sea-coast.

(*d*) The Mississippi and the inland waterways.

(*e*) The railways and communications.

The following are examples:—

(1.) Name four of the principal productions of the United States, and say what towns are specially interested in each product.

(2.) Say what you know of the mouth of the Mississippi River, and explain why curved lakes are found near this river.

(3.) Give a general description of the prairie states of America.

(4.) Choose any one of the United States railways. Name its termini and places along its route.

(5.) Contrast the climate and productions of the east coast with those of the west coast.

(6.) What do you know of the following:—San Francisco, Boston, Yellowstone Park, Portland, Concord, Hertford, Brooklyn, Pittsburg, Baltimore, Richmond, Charleston, Savannah, Oregon, Omaha, Bismarck, Seattle, San Diego, Tampa, Memphis, etc.?

New Zealand.—In the geography of New Zealand the chief points to notice are—the mountain and river system, the "Wonderland" of North Island (geysers, medicinal springs, volcanoes, etc.), the industries and towns, imports and exports, with some knowledge of the Maoris.

9. *History.*—The reign of George the Third, 1760–1820.

The close of the Seven Years' War is important in its results. The Treaty of Paris started England on its career of colonial empire by securing Canada and a paramount interest in India. The affair of John Wilkes is more important as showing the feeling of the country than as regards the man himself. It was not the *person* but the *principle* which received support, the latter being the right of the newspaper to criticise fearlessly the actions of the government. It must be remembered that the House of Commons was elected by the *few*, and did not in any way represent the nation.

The American War of Independence. The desire of the government to make the American colonies pay something towards the great expense of the war which had been waged mainly on their behalf was quite natural and legitimate. It was the *manner* of doing it which produced the opposition. "Taxation and representation" were regarded in England as inseparably united, and the same principle should have been applied to the colonies, which were loyal and willing to pay.

The indecision of the home government in first imposing taxes and then withdrawing them increased the irritation felt, and drove the colonists to final separation.

The details of the war must be prepared, and a sketch map to illustrate the places mentioned.

The question is sometimes put, "Why were the colonists successful?" They were few in number, deficient of the resources of the mother country, and divided in opinions. The answer is:—

(1.) They were fighting for home and freedom.

(2.) They were in their own country (always a great advantage) and close to supplies, while the government troops had to be fed from England.

(3.) They adopted the methods of Indian warfare, while the English generals followed the tactics prescribed by European opinion. The recent war has taught us the necessity of adopting methods similar to our opponents.

(4.) The intervention of France and Spain. The former was eager to avenge the loss of Canada.

The Gordon Riots must be thoroughly understood. The protest of the Protestants against the repeal of the laws against the Catholics simply gave the opportunity for all the rascality in London to indulge in riot and pillage. The possibility of such a thing as London being in the hands of a mob for three days is a valuable insight into the weak administration of cities in those times, as far as police regulations are concerned.

The French Revolution. The following must be carefully studied:—

(*a*) The causes which produced it. If possible, read the opening chapters of Carlyle's *French Revolution*.

(*b*) The National Assembly at Versailles.

(*c*) How the power drifted into the hands of the Paris mob, who were responsible for the atrocities committed.

(*d*) The effects on other nations. The revolution was at first welcomed by many leading Englishmen. They sympathised with the movement, although they did not approve of the massacres.

(*e*) The war with France, which lasted over twenty years, and cost England over £600,000,000.

The careers of Nelson and Wellington must be carefully followed. The former checkmated Napoleon's plans at sea, the latter crushed him on land.

Note the results of the chief battles:—

(1.) The Nile stopped Napoleon's designs on India and his dream of establishing an eastern empire.

(2.) Copenhagen broke up the Northern Confederacy, and prevented invasion.

(3.) Trafalgar entirely destroyed the French and Spanish fleets, and removed all fear of invasion.

The Peninsular War was really the cause of Napoleon's ultimate defeat. "The Spanish ulcer destroyed me," was his true remark.

The four years' campaigns must be followed carefully.

The Hundred Days and the battle of Waterloo must be studied, and a plan of the latter committed to memory.

The distress which followed the close of the war was very acute. Causes—(*a*) The invention of labour-saving machinery, which threw men out of work, since the machines caused a sudden increase in production before an equally sudden demand; (*b*) the series of bad harvests; (*c*) the heavy burden of taxation. Between twenty and thirty millions a year were required to pay interest on the national debt, and that at a time when the national revenue was under forty millions per annum.

This reign is also noteworthy for the industrial revolution. In 1760 England was mainly an agricultural country; by 1820 it had started on its career of manufacturing. The invention of various machines, and the application of steam to them, was far more important than the French wars.

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10. *Arithmetic.*—Problems on motion and clocks. Chaps. lvi. and lvii., Christian and Collar.

The explanations given are very clear, and must be carefully followed. Work the exercises given in the book, and the following paper (set in 1901):—

(1.) What is an odd number? How can you tell if a number is odd or even? How can you tell whether (*a*) the sum, (*b*) the product of several numbers, is odd or even?

(2.) A path, 4 feet wide, is made along two sides and one end of a rectangular lawn. The sides of the lawn inside the path measure 15 yards 1 foot 6 inches, and the ends measure twelve yards. Find the area of the path.

(3.) The G.C.M. of two numbers is 13, and the L.C.M. is 819. Find the product of the two numbers, and explain how the result is obtained.

Is the G.C.M. of two numbers always a factor of the L.C.M.? Give reasons for your answer.

(4.) Give a rule for the addition of decimals.

Simplify—

(*a*) 2·24 lbs. + 7·12 cwt. + 4·643 tons.

(*b*) $\cdot\dot{7}$ kilogrammes + $\cdot\dot{2}$ grammes.

(5.) Find to the nearest penny the simple interest on £249, 19s. 9¾d. for 10 years at 4 per cent.

(6.) Goods are manufactured at a cost of £2, 14s. 6½d. per ton. Three hundred and sixty tons are exported at a cost of £5, 10s., and are sold, after paying duty at the rate of 3s. 5½d. per ton, at £3, 7s. 11d. a ton. How much did the manufacturer gain?

(7.) A and B grind corn. A grinds 10 per cent. more corn than B in an hour, but works for 10 per cent. less time. Will A grind more or less corn than B in a day, and by how much per cent.?

(8.) What is meant when the measure of a quantity is said to be correct to 4 significant figures? Divide 24·946742 by 7 to 4 significant figures.

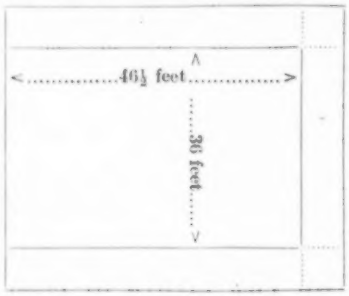
(9.) A rectangular column of iron is 10 metres long. The cross section is a square whose side is 125 millimetres. The column weighs 1218¾ kilogrammes. Find the weight of a cubic centimetre of iron in grammes.

(10.) I buy £7200 stock, and after paying income tax at 1s. 2d. in the pound, have an income of £169, 10s. What rate per cent. was the stock paying?

(11.) The incomes of two men would be equal if one was diminished by 8 per cent. and the other increased by 9 per cent. The sum of their incomes is £1407. Find income of each.

Notes on the solutions:—

(2.) Draw a diagram:—



The area of path is 2 rectangles $46\frac{1}{2}' \times 4'$
1 rectangle $36' \times 4'$
2 squares $4' \times 4'$

(3.) G.C.M. = 13. L.C.M. = 819 = 13 × 7 × 9.

The two numbers are $\begin{matrix}13\times7\\13\times9\end{matrix}$. This is evident from the factors of the L.C.M.

(4.) Do not reduce the decimals to fractions.

4·643 tons = 643
20
12860
4
3440 = 4 tons 12 cwt. 3 qr. 12·32 lbs.
28
352
88
12·32

(5.) £100 in ten years at 4 per cent. gain £40, or ⅖ of itself.
∴ Simple interest = ⅖ of (£249, 19s. 9¾d.)
= ⅖ of (£250, 0s. 0d. − 2¼)
= £100 − $\frac{8}{15}$d.
= £99, 19s. 11d.

(6.) Cost of goods = £2 14 6½
Duty = 3 5½
£2 18 0
∴ Ans. = 360(£3, 7s. 11d.) − 360(£2, 18s.) − £5, 10s.
= 360(9s. 11d.) − £5, 10s.

(7.) Suppose B does 100.
Then A would do 110 in the same time.
He works for $\frac{9}{10}$ of the time, and does $\frac{9}{10}$ of $\frac{11}{110}$ = 99, etc.

(9.) Reduce measurements to centimetres.
Length = 1000 centimetres, Section = 12·5 centimetres } Content = 1000 × 12·5 × 12·5 c.c.
= 156250 c.c.
1218·75 kilogrammes = 1218750 grammes.
∴ Ans. = 7·8 grammes.

(10.) State thus:—
Original income which leaves £169, 10s.
$$= \frac{\text{£169, 10s.}}{\text{18s. 10d.}} \text{ of £1} = \text{£180.}$$
Then interest on £7200 = £180.
$$\text{£100} = \text{£}\frac{180}{72}, \text{ etc.} = \text{£2}\tfrac{1}{2}.$$

(11.) Let 100 = amount when both are equal.
Then 100 is $\frac{100}{108}$ of A.
,, is $\frac{100}{92}$ of B, etc.

11. *Algebra.*—Ratio, proportion, and arithmetical progression. Learn carefully how the formulæ are established in the latter.

12. *Euclid.*—Props. 13 and 14, Book II., with six deductions per week.

13. *Elementary Science.*—The preparation and properties of coal gas, hydrochloric acid, and sulphuric acid.

14. *General Information.*—Read up answers to one or two papers in the book of questions used.

Test Paper in General Information.

Answers will be marked gratis if sent direct to Mr. A. T. Flux, Oakleigh, Belvedere, Kent, with stamped addressed envelope for their return. The coupon of the current number must be enclosed.

1. Punctuate, "He said I think it was if not but or though."
2. What is sleep?
3. How can we prove that the earth is not exactly spherical?
4. Describe the circulation of the blood through the body.
5. How is it possible to foretell the weather?
6. Explain: Chinook, blizzard, harmattan, bise, typhoon.
7. To what do the following historical quotations allude:—
   (*a*) "Every man has his price."
   (*b*) "I know that I can serve the country, and that no one else can."
   (*c*) "Now they are ringing their bells; they will soon be wringing their hands."
   (*d*) "Roll up that map of Europe; it will not be wanted these ten years."
   (*e*) "Thy necessity is greater than mine."
   (*f*) "Put not your trust in princes."
8. What are caoutchouc, cinnamon, annato, spermaceti, amber, esparto, and ambergris? Whence are they obtained?

Test Questions on the Month's Work.

1. Penmanship:—
   Large hand.—*Impossibility.*
   Small hand.—*This England never did and never shall*
   Lie at the proud foot of a conqueror.
2. Point out how you would give a first lesson on analysis.
3. Explain the following:—Which with experimental seal doth warrant the tenour of my book—strange misprision—a goodly count, Count Confect—that's the eftest way.
4. Describe in your own words the scene at Hero's marriage, *or* give the substance of Bacon's essay on *Studies.*
5. Describe a journey across Africa from Zanzibar to Loanda.
6. Draw a map of Africa, and indicate the parts under the sway of the various European nations.
7. What attempts were made by the Stuarts to regain the throne?
8. What was the reformation of the calendar? Why was it necessary? What steps were taken to prevent such necessity again?
9. How is sulphur obtained? In what various forms may it exist? What are its chief compounds?
10. (*a*) Write the following key signatures (note that some are major and some minor)—F♯ minor, C minor, G minor, E major, A♭ major.

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(*b*) Write the following in the staff notation :—

KEY A.

$s_1 \mid d : r.m \mid r : m.f \mid m : r \mid d : d^1 \mid t_1.l.s : f \mid m : -.r \mid d : - \mid m : d \mid$

11. Write the following passage from dictation :—

Valuable, indeed, | is the privilege | of following Macaulay | through his favourite volumes, | where every leaf | is plentifully besprinkled | with the annotations | of the most lively of scholiasts ; | but it would be an injustice | towards his reputation | to separate the commentary | from the text, | and present it to the public | in a fragmentary condition. | Such a process would give | but a feeble idea | of the animation | and humour | of that species | of running conversation | which he frequently kept up | with his author | for whole chapters together. | Of all the memorials of himself | which he has left behind him, | these dialogues | with the dead | are the most characteristic. | The energy of his remonstrances, | the heartiness of his approbation, | the contemptuous vehemence | of his censure, | the eagerness | with which he urges | and reiterates | his own opinions, | are such | as to make it at times | difficult to realise | that his remarks | are addressed to people | who died centuries ago.

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3. *English.*—(*a*) *Lay of the Last Minstrel*, Canto II. Prepare stanzas 16–30.

Learn the exact meaning of all references and allusions. Be prepared to analyse the whole, and to parse any word.

(*b*) Learn ten roots and meanings per week.

(*c*) Learn the Anglo-Saxon prefixes.

(*d*) The grammar and syntax of the preposition.

4. *Geography.*—The geography of Ireland. Learn a good memory map, showing the position of all physical features and the chief towns.

The following questions have been asked :—

(1.) Draw a map of the basin of the Shannon, marking the boundaries of the basin, the chief tributaries, and towns on it.

(2.) Mention six of the chief ports of Ireland, and give their imports and exports.

(3.) Why is Ulster more flourishing than the rest of Ireland ? What industries are carried on there ? (The first part refers to the colonisation of Ulster in the reign of James the Second, and the consequent admixture of Anglo-Saxon blood.)

(4.) Give some account of the islands round the Irish coast.

(5.) Where and what are the following, and for what are they noted—Kingstown, Bog of Allen, Connemara, Killarney, Queenstown, Vale of Avoca, Nephin Beg, Giant's Causeway, Rathlin, Carrickfergus, Donaghadee, Wicklow, Curragh, Castlebar, Valentia, Belfast, Londonderry, Coleraine ?

(6.) Describe a fortnight's tour in North Ireland. What places would you be likely to visit, and why ?

5. *History.*—Richard, John, and Henry the Third.

Richard.—The reign of Richard is not very important, as far as English history is concerned. He was absent in Normandy or the Holy Land nearly all the time, and during his absence the country was fairly peaceable. The history of the Third Crusade must be read up. Scott's *The Talisman* and *Ivanhoe*, though not correct history, give a good idea of the times.

John.—The chief points are :—

(1.) The question of John's right to the throne. His disposal of Prince Arthur, and consequent loss of the French provinces.

(2.) The quarrel with the Pope over the election of a new archbishop. The interdict and excommunication. Distinguish these carefully, and notice, while the interdict had no effect on the king, the excommunication brought him to his knees. The latter curse absolved his barons from their allegiance, and practically took away all his power.

(3.) The misrule resulted in the Magna Charta. Learn the circumstances which led to it, and its chief provisions. Notice that *all* classes had united against the king.

Henry the Third.—(*a*) The minority and the rule of the justiciars, especially Hubert de Burgh.

(*b*) The years of personal rule and misgovernment. Money squandered, favourites (Poitevins and Provençals) displacing the barons.

(*c*) The Mad Parliament, and the Provisions of Oxford.

(*d*) The Barons' War.

(*e*) De Montfort's Parliament, to which, *for the first time*, representatives of the Commons were called. This is a very important point, and must be carefully studied.

Learn lives of Langton, De Burgh, De Montfort.

6. *Arithmetic.*—Decimal fractions and their application to weights and measures. Study the theory carefully, and especially that referring to recurring decimals. Be prepared to answer such questions as :—

(1.) In what sense is $\cdot\dot{9}$ said to be equal to 1 ?

(2.) Prove the rule for the multiplication of decimals. (This can be done by fractions.)

(3.) What is the value of the remainder after ·012575 has been divided by ·015 to three places ?

(4.) Why is it that when one decimal fraction is divided by another the result sometimes is larger than either ?

Note particularly the values of the sevenths—the recurrence of the same figures. In finding the value of a decimal fraction of a concrete quantity—for example, ·3125 of a ton—do *not* reduce to fractional form, but work thus—

$$\begin{array}{r} \cdot 3125 \\ 20 \\ \hline 6\cdot 2500 \\ 4 \\ \hline 1\cdot 0000 \end{array} = 6 \text{ cwt. } 1 \text{ qr.}$$

7. *Science.*—The lever, parallel forces, parallelogram of forces.

Note the three "orders" of levers, with common examples of each. The parallelogram of forces must be carefully studied, and examples worked out with a graduated ruler.

8. *Music.*—Divisions of pulses into halves, quarters, thirds, etc.

Test Questions.

1. Write as specimens of copy-setting :—

Large hand.—*Verisimilitude.*

Small hand.—*It was not by vile loitering in ease*
That Greece obtained the brighter palm of art.

2. Write out a good classification of the adverb.

3. Analyse the following, and parse the words in italics :—

"He had *nothing to say*, when *pressed* with *this* in the *next* parliament, *but that* he had misgrounded his opinion upon a certain precedent, *which being nothing* to the purpose, he was now assured his opinion was *as little* to the purpose."

4. Describe a tour in Western Scotland, mentioning the chief places visited, and what there is to be seen in them.

5. Say what you can of the chief industries of Scotland.

6. What were the exact grounds of dispute between Henry the Second and Becket ? Which do you think was right ?

7. Give some account of the conquest of Ireland.

8. Explain carefully how you would find the specific gravity of (*a*) a solid, and (*b*) of a liquid. A stone weighs $3\frac{3}{4}$ lbs. in air, and $2\frac{1}{4}$ lbs. in water. What is its specific gravity ?

9. Name the following intervals,—

$$\left\{\begin{matrix} d^1 \\ m \end{matrix}\right. \quad \left\{\begin{matrix} n^1 \\ f \end{matrix}\right. \quad \left\{\begin{matrix} ta \\ r \end{matrix}\right. \quad \left\{\begin{matrix} d^1 \\ re \end{matrix}\right. \quad \left\{\begin{matrix} se \\ t_1 \end{matrix}\right.$$

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4. *English.*—(*a*) Goldsmith's *Traveller*, lines 255–280.

General paraphrase : Such is the happy life led by these people busy with frivolities. Their chief ambition is to have the admiration and applause of others, whether genuinely deserved or not. This is the prevailing weakness in all ranks of society.

But as in other cases, this one source of happiness leads also to folly ; for when the opinion of other people becomes a matter of great importance to the individual, he gradually loses his self-esteem and reliance, and acts continually with a view of pleasing others. The result is that those who have no qualities deserving of admiration assume them for the purpose of attracting attention, and the genuine golden character is difficult to distinguish from the spurious imitation. The poor deny themselves necessary food in order to give occasionally a feast to their friends, which shall excite their admiration and praise. Thus the consciousness of having done right is made subservient to the good opinion of the outside world.

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TEST QUESTIONS ON LAST MONTH'S WORK.

English Language and Literature.

1. Give a summary or analysis of the first act of *Richard the Second.*

2. Explain the terms *inhabitable, miscreant, recreant, fantastic summer heat, boot, doom,* and *largess.*

3. Describe as fully as possible the historical events that led to the quarrel between Bolingbroke and Mowbray.

English History.

1. What advantages did the vassal gain under the feudal system? What were his recognised liabilities?

2. Describe carefully the treatment of the English by William the Conqueror.

3. Discuss the character of Henry the Second.

Geography.

1. Describe the central mountain system of Europe.

2. Show that the chief trade routes of Europe follow the great river valleys, and indicate the chief points at which mountain chains are crossed by them.

Arithmetic.

1. Explain the principle of proving the correctness of sums by casting out the 9's. In what cases may it fail to detect an error?

2. State and prove the rule for the divisibility of a number by 11.

Algebra.

1. State and prove the "remainder theorem."

2. What means would you adopt to illustrate to a class of beginners—

(*a*) The equivalence of $b + (m - n)$ and $(l + m) - n$.

(*b*) What is meant by the degree or dimensions of an expression (or term), showing clearly the difference between $2d$ and d^2?

3. Find by factors the L.C.M. of $a^2 + 8ab + 12b^2$ and $a^2 - 2ab - 8b^2$. Of what degree is the expression in your result?

Geometry.

1. Equal triangles on equal bases in the same straight line and on the same side of it are between the same parallels.

2. Of all the triangles upon the same base whose areas are equal, the isosceles triangle has the least perimeter.

Theory of Teaching.

1. What are the characteristics of good questions?

2. What do you mean by "perception," "conception," and "apperception"?

3. What are the "five points" or steps to be observed in drawing up notes of a lesson?

Elementary Science.

1. Explain as to children what is meant by "mass," and show the difference between mass and weight.

2. What is meant by density? How is it measured, and what is the relation of unit of density to other units?

NOTES AND SYLLABUS FOR SEPTEMBER.

English Composition.

Study Nesfield's *English Composition,* chaps. iv. and v., or to the end of chap. v. in Meiklejohn's *Art of Writing English,* and work the exercises.

Prepare and write essays on the following, which were the subjects set at the Certificate Examination in July last:—

1. The arguments for and against making attendance at evening continuation schools compulsory by law for scholars who have left the elementary day schools.

2. The reasons by which you would be guided in your choice of a daily newspaper.

3. The improvements effected in agriculture during the last thirty years by scientific inventions.

Theory of Teaching.

Read carefully the chapter on notes of lessons, and put into practice the instruction there given when you draw up notes for your own lessons. You will then have no difficulty in drawing up satisfactory notes in the examination. The following are among those that have actually been set at the Certificate Examination:—The use and abuse of object lessons. Wild flowers (*for infants*). Travelling. The sea. A transitive verb. The measurement of surfaces. Colours (*for infants*). The Spanish Armada. The art of printing. The parts of a house (*for infants*). Reduction to a common denominator. Fisheries. The manufacture of *either* iron *or* porcelain. Iron and steel (*for infants*). Greatest common measure. The mariner's compass. Words ending in *-tion.* Birds of passage. A carpenter's shop (*for infants*). Glaciers. The savings bank. Some simple rules for preserving health. The use of metaphors. Plants used as food (*for infants*). A court of justice. A ship (*for infants*). Rain and snow. The sun. A mouse (*for infants*). Addition of vulgar fractions. The Chino-Japanese War. Good manners. Gibraltar. Bread (*for infants*). The planetary system. Westminster Abbey. The number twelve (*for infants*). Adjectives and adverbs.

Prepare the chapter on reading (chap. vii., Collar and Crook's *School Management*). In connection with such a subject there are many matters that are open to argument. The arguments on both sides of the question should be mastered, and your judgment given to that which seems to have most weight. Your opinion may not be the same as the examiner's, but you will get full credit if you can show that you have full knowledge of the points which lead you to form your opinion, and are not ignorant of the arguments that can be urged against it. Moreover, "circumstances alter cases," and a plan which is good under one set of conditions would be ill advised under others. This applies with particular force to such a matter as simultaneous reading. If other classes are at work in the same room, it should be avoided; and even when the class is working in a room by itself, simultaneous reading should be resorted to with discretion. It is difficult to ensure that every pupil is really reading—that is, expressing what he sees printed in the book; for, with a little practice, he can listen to what the others say and then repeat it, and yet not lag behind more than a slow but conscientious reader would do. Owing to the volume of sound, the teacher has a difficulty in noticing inaccuracy and indefiniteness about the words read, and a lazy teacher will not try to detect these. On the other hand, we have no guarantee that the "lazy" teacher will take trouble to secure perfection and finish to the reading of individuals, and we must not omit the positive advantages secured by some amount of simultaneous reading. The art of reading requires much practice, and the amount of practice is very considerably increased by allowing children to read together. The pace of the reading is controlled; those pupils who are inclined to go too fast or too slow are made to keep along with the average, which, under the teacher's direction, can be fixed at the normal and suitable rate. There is a good disciplinary effect in having work done collectively by the class, but yet under the control of the teacher.

English Language and Literature.

Study in detail the second act of *Richard the Second.*

Scene i., line 21. *Italy.* Shakespeare here satirically reflects upon the tendency of his contemporaries to copy Italian fashions. Even in the time of Richard the Second this was the case, so that there is no anachronism. It was customary in the sixteenth century for English nobles who had finished their schooling to visit the great cities of Italy, whence they often returned with fantastic garments and fashions, and having often added the vices of foreign lands to those of their own. Hence arose the proverb, "An Englishman Italianated is the devil incarnated." Our words "milliner" and "mantua-maker" are derived from the names of the two Italian towns Milan and Mantua, which were centres of fashion.

28. That is, "Where the will rebels against the reasoning and advice of the understanding." "Wit" in O.E. often denoted the higher intellectual faculties.

44. *Against infection.* The advantage of living in an island has been demonstrated by the success which has followed the efforts to stamp out rabies among dogs and certain diseases among cattle.

51. *Teeming* = fruitful; prolific. "To teem" is to bring forth. Compare King Lear's curse on his daughter—

> "If she must *teem,*
> Create her child of spleen."

60. *Pelting* = paltry; pitiful. Compare "poor pelting farms" (*King Lear*). Enter King Richard and *Queen.* The introduction of Richard's queen as a woman is one of the historical inaccuracies

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of the play; for Anne was dead before the period at which the play is laid, and Isabella, his second wife, was only a child at the time of Richard's death. The reader will notice how much, from a dramatic point of view, the play gains by the liberty Shakespeare took with strict historic truth.

71. *Fares*, from the A.S. *faran*, "to go." Compare "welfare," "thoroughfare," "to pay the fare," and "ferry."

84. *Nicely*—that is, ingeniously, or with regard to minute details. Coleridge answers the question in the affirmative. "Critics," he says, "who argue against the use of a thing from its abuse have taken offence at the introduction in a tragedy of that play on words which is called punning. But how stands the fact with nature? Is there not a tendency in the human mind, when suffering under some great affliction, to associate everything around it with the obtrusive feeling, to connect and absorb all into the predominant sensation?"

90. *A-dying.* The prefix = "in." Compare "and she lay a-dying;" "while the ark was a-preparing;"

> "There is some ill a-brewing towards my rest,
> For I did dream of money-bags to-night."
> *Merchant of Venice.*

93. *I see thee ill.* The next line explains that the adjective "ill" is meant to qualify both the subject "I" and the object "thee."

98. This line presents a difficulty in scansion. If the first word is made a trisyllable, the line will contain six feet. There are instances of such lines in Shakespeare's blank verse, but they are probably due to the poet's oversight. If it is pronounced "commit'st," the "y" of the next word must be elided—

Commit'st | thy an-oin | ted bod | y to | the cure.

114. The position assigned you by the law is subject to the legal restrictions attaching to agreements and leases. The reference is to Richard's farming of the royal revenues, and the general degradation of the royal prerogative.

126. *Like the pelican.* The pelican was said to feed its young with its own blood when other food ran short.

156. *Kerns*, Irish peasantry serving as light-armed foot-soldiers. Spenser, in his *View of the Present State of Ireland*, gives them a very bad character.

200. *God forbid I say true!*—that is, "God forbid that the condition I am stating may be true;" that is, "if you do wrongfully seize," etc.

202. *Letters patents*, from Latin, *pateo*, "I lie open." The king's letters patents are letters which lie open for all the world to read. The adjective has now become a noun, and we commonly say simply "patent."

247. *Pilled* = pillaged.

265. *Securely perish.* With the modern meaning of "securely" this phrase is absurd. The original meaning of *secure*, however, was "free from care or anxiety;" hence the phrase means "to perish through having no care for our safety." Compare—

> "Upon my *secure* hour thine uncle stole
> With juice of cursèd Lebanon in a vial."
> *Hamlet.*

Scene ii. Coleridge says of this:—"The scene between the queen, Bushy, and Bagot is also worthy of notice, from the characters all talking high, but performing nothing; and from Shakespeare's tenderness to those presentiments, which, wise as we will be, will still adhere to our nature."

18. *Perspectives.* These were pictures with strips fixed at right angles to them. When looked at straight from the front, the picture was seen; when looked at from one side, a picture was formed from the pieces on one side of the strips, while the other side of the strips formed another picture for any one standing in the right position on that side. The reader has no doubt seen the same principle applied to the advertisement of soap.

62. Here the queen takes up the metaphor of lines 34–36.

Scene iii., line 5. *Draws.* Note the want of agreement, which is probably due to the poet's carelessness.

15. *To joy*—that is, to *enjoy.* The hope of enjoying a thing gives almost as much pleasure as enjoying the thing hoped for.

80. *Self-born*, arms that have no cause for their existence.

134. *Attorneys*, deputies; those who are authorised to act for another.

156. *Attach*, in legal language, means to lay hold of a person, to apprehend him on a charge of crime.

166–7. *Caterpillars of the commonwealth* is in itself a good metaphor, but it is spoilt by being mixed with that in the next line. We do not *weed* out caterpillars. This should be noted as an example of "mixed metaphor."

Scene iv., line 24. *Crossly to thy good*, adversely to the good of thy cause.

English History.

Go to the year 1399. This is a very important period in connection with the settlement of the constitution, and in questions of social development.

All students should read Miss Bateson's *Mediæval England*, which gives a remarkably interesting and picturesque account of social life during this period. The development of the English courts of law has recently formed the subject of a special paper in our magazine. Attention must be given to the way in which any attempt to infringe the liberty of the English people was met, and particularly to the stand that was made against such a powerful monarch as Edward the First. Towards the latter part of his reign this king gave way to a spirit of rapacity and violence which he had never shown during the better part of his life. After the outbreak of hostilities with France in 1293, on one occasion, for instance, he arbitrarily fixed the amount of wool that should be exported, and commanded that a third of the value of the exported wool should be paid to the crown. The rest of the wool that had been prepared for exportation was seized and confiscated for the king's benefit upon his own personal orders. He sent requisitions to the sheriffs of all English counties for large supplies of wheat and oats, and ordered that the grain should be seized wherever it could be found. When Parliament granted him a subsidy of a specified amount in 1296, he greatly increased the amount on his own authority the next year. The two nobles who opposed the king on this occasion were Humphrey Bohun, Earl of Hereford, and Roger Bigod, Earl of Norfolk. Of these men Hallam says: "I do not know that England has ever produced any patriots to whose memory she owes more gratitude than Humphrey Bohun and Roger Bigod. In the Great Charter, the base spirit and deserted condition of John take off something from the glory of the triumph, though they enhance the moderation of those who pressed no further upon an abject tyrant. But to withstand the measures of Edward, a prince unequalled by any who had reigned in England since the Conqueror for prudence, valour, and success, required a far more intrepid patriotism."

The immediate cause of their resistance was a command from the king that they were to sail with their retainers into Guienne against the French, while the king led another army into Flanders. They refused to join, on the ground that by their offices—Lord High Constable of England and Marshal of England—they were only bound to go when the king commanded in person. The other nobles showed so much inclination to support them, that the king deemed it prudent to desist, and not plunge the country into a civil war. He made a conciliatory speech to the citizens of London, which shows how much deference he felt was due to public opinion, and then proceeded with his expedition to Flanders. Before he went, however, he received a document, which is sometimes called the "first grand remonstrance." This complained that the king had repeatedly violated the liberties granted by the Great Charter and by the Charter of the Forest, and stated that the wool tax was intolerable. Two days after the king started for Flanders, Bohun, Bigod, and others forbade the king's treasurer and officers of the exchequer to collect any more illegal taxes. The Prince of Wales, as regent, called a Parliament, and in this the *Confirmatio Cartarum* was drawn up. This began by affirming the Charter of Liberties and of the Forest, and ordered them to be read to the people by the sheriffs, and copies of them to be kept in every cathedral church and read publicly twice a year, and sentence of excommunication was to be pronounced on all who broke them. It then placed the subjects' property under the protection of Parliament, and ordered that no aids, etc., should be levied except "by the common consent of all the realm, and for the common profit thereof." The king affixed his seal to this on November 5, at Ghent. On his return the barons required him to renew his confirmation, which he attempted to do "without prejudice to the rights of the crown." This reservation would have made all charters illusory, and the people refused to accept it. Civil war seemed on the point of breaking out, but the king gave way, and unreservedly granted the charter. We have written at length on this great statute because of its importance. Hallam, in fact, calls it "another pillar to our constitution, not less important than the Great Charter itself." There are, however, many important statutes that require very close study in connection with this period.

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a hundred miles of the English Channel. Champagne is produced in the valley of the Marne; Rheims and Epernay are the chief centres. Saumur comes from the district just south of the lower Loire. Claret comes from the district near Bordeaux, especially in the part between the Gironde and the Bay of Biscay. Burgundy comes from the east, near Dijon. Brandy is distilled in many parts, but the best comes from the Champagne district and the valley of the Charente, in which is situated the town of Cognac, which gives its name to much of this spirit. Corn is grown in all parts, especially in the north. In this part also beetroots are largely grown. During the wars between England and France about a hundred years ago, when the English navy commanded the sea and the French had great difficulty in obtaining colonial produce, Napoleon encouraged the use of beetroot as a substitute for cane sugar, and of chicory as a substitute for coffee. Beetroot sugar is still largely grown, and the production of beet sugar has been encouraged by large bounties from the government. The olive is largely grown in the south, and oil is made, while the mulberry tree affords food for millions of silkworms. Fruit is grown in large quantities, particularly plums near Bordeaux, where they are often dried, and in Normandy, where also beautiful apples and pears are grown. Poultry and eggs are exported to England in large quantities from Normandy and Brittany, and dairy produce is also sent, but not in such large quantities, owing to the successful competition of the co-operative Danish farmers.

In the production of coal and iron France comes after Great Britain, the United States, Germany, and Belgium. The chief coal-fields are in the north, round Valenciennes and Anzin, and in the centre, near St. Etienne, Alais, and Le Creusot. The chief iron mines are in the east and the centre, in the departments of Meurthe-et-Moselle, Haute-Marne, and Puy-de-Dôme. The chief towns are St. Etienne, Le Creusot (celebrated for guns and other machinery), and Lille.

Stone is good and abundant. Paris owes much of its fine appearance to the abundance of good building stone found in the neighbourhood. Marble is found in the Pyrenees, sandstone in the Vosges, and slates at Angers. Salt is produced from the salt marshes and lagoons in the Landes to the south-west, and rock salt is found in Lorraine and in the Jura. Many mineral springs are much sought after, as those of Vichy, on the Allier. The preservation of fruits, truffles, and fish (sardines principally) occupies a great many hands.

The woollen industry is carried on where there is a supply of coal, and where wool can be easily obtained, either locally or by importation. Roubaix, Turcoing, and Amiens use large quantities of Australian wool, which is re-exported from London. Rheims manufactures local wool. Elbœuf and Louviers manufacture wool imported through Le Havre and Rouen. Rouen is the great centre of the cotton trade; large classes of cotton goods are hence called "rouennerie." Some of the raw cotton is landed at Le Havre, but the Seine now admits the passage of ocean-going vessels as far as Rouen.

The seat of the silk industry is fixed at Lyons, Avignon, and other places in the Rhone valley where the land is suitable for the production of the mulberry tree.

The chief imports are corn (in years of scarcity), raw cotton and wool, coal, paraffin, machinery, steel, and colonial produce. The chief exports are wines and spirits (brandy and liqueurs), fruit, silk goods, clothes, bronzes, crystals, porcelain, and fancy goods.

France is well supplied with railways, and these run in connection with international services. Direct trains go from Paris to Spain, Italy, St. Petersburg (*vid* Germany), and to Constantinople *vid* Vienna (Orient Express). The chief shipping lines are the Transatlantique, plying between Le Havre and St. Nazaire and the United States, and the Messageries Maritimes, which plies between Marseilles and the Mediterranean ports and the Far East.

Arithmetic.

Study the theory of vulgar fractions, and work examples from each of the sections. The use of concrete and graphic illustrations is a matter that requires close attention.

The following question was asked in July last:—

A common factor of two numbers is also a common factor of the sum or difference of the two numbers. What illustrations or concrete examples would you use to make this clear to children?

The sum of two numbers is 10,000. How can you tell, by inspection of the numbers, whether they have a common factor?

It should be noticed that the rule is given as an axiom. It is a fundamental truth, and admits of no proof. The statement may be expressed in algebraical symbols thus: $am = an = a(m \pm n)$; but this is not a proof, and, indeed, the algebraical identity depends on the rule, and not the rule on the identity. It is not difficult, however, to provide illustrations which will make this clear to children; for they will readily see that if one number of marbles be added to another number of marbles, the result must be a number of marbles—it cannot be a number of pens or different things: so if we take a number of books from a given number of books, we must have a number of the same kind of thing (namely, books) left. Hence children will easily see that if we add a number of fives to another number of fives, the result will be a number of fives; or if we take a number of sevens from a larger number of sevens, we must have a number of sevens left. The last step in the lesson consists in explaining that when we say that five is a common factor of two numbers, we merely mean that each number consists of a number of fives, and therefore if 5 (or any other number) is a common factor of two numbers, it is a factor of their sum or of their difference.

The next part of the question is a simple application of the rule; for since the common factors of the numbers are found in their sum, and the only prime factors of the sum (10,000) are 2 and 5, it follows that the numbers have no common factors, unless (*a*) they are both even, or (*b*) both end in 5.

Algebra.

Revise the rules for factorising expressions. The "remainder theorem," with which we dealt last month, will be found of great service in factorising, and should be freely used.

The rule that the product of the sum and difference of two numbers is the difference of their squares is applicable to a large number of expressions which may be reduced to the form $a^2 - b^2$, as may be seen from the following examples:—

(i.) $x^2 - y^2 + 2zy - z^2 = x^2 - (y^2 - 2zy + z^2)$
$= x^2 - (y - z)^2 = (x + y - 2)(x - y + z)$.

(ii.) $a^2 + b^2 - c^2 - d^2 - 2ab - 2cd = (a^2 - 2ab + b^2) - (c^2 + 2cd + d^2)$
$= (a - b)^2 - (c + d)^2 = (a - b + c + d)(a - b - c - d)$.

(iii.) $x^4 + x^2y^2 + y^4 = x^4 + 2x^2y^2 + y^4 - x^2y^2 = (x^2 + y^2)^2 - (xy)^2$
$= (x^2 + xy + y^2)(x^2 - xy + y^2)$.

(iv.) $x^4 + 4x^2y^2 + 16y^2 = x^4 + 8x^2y^2 + 16y^2 - 4x^2y^2 = (x^2 + 4y^2)^2 - (2xy)^2$
$= (x^2 + 2xy + 4y^2)(x^2 - 2xy + 4y^2)$.

(v.) $x^4 - 9x^2y^2 + 16y^2 = x^4 - 8x^2y^2 + 16y^2 - x^2y^2$
$= (x^2 - 4y^2)^2 - x^2y^2 = (x^2 + xy - 4y^2)(x^2 - xy - 4y^2)$.

Geometry.

Master the second book of Euclid. Observe the relation between the geometrical results and the algebraical formulæ by which they can be expressed. Notice that the fifth and sixth propositions really prove the same thing—the fifth dealing with the case in which the movable point (that is, the one that divides the line in two *unequal* parts) is on the line itself, and the sixth dealing with the case in which the movable point is beyond the extremity of the line. So also the ninth and tenth are similarly related; and a similar relation holds good between the twelfth and thirteenth, which, with the forty-seventh of the first book, may be regarded as forming three cases of the same theorem. It will be necessary, in thus grouping propositions, to remember the convention adopted in modern geometry—that lines measured in one direction are treated as positive quantities, while lines measured in the other direction are to be regarded as negative.

Elementary Science.

Study the special characteristics of solids.

A rigid body is one that offers resistance to any attempt to change its shape. Rigidity is also a relative term. It is accurately defined as resistance to shearing. Shearing consists of an extension in one direction combined with an equal compression in a direction perpendicular to it. Compressibility, or resilience of volume, is a property possessed by liquids and gases. Suppose a body has a volume V, and as a result of an increase of pressure P, it suffers a diminution of volume v; then $\frac{v}{V}$ is the measure of compression—that is, the fraction which the diminution is of the whole volume; and if the normal increment of pressure per square unit be divided by this fraction, the result is the "resilience of volume." Of course, $\frac{P}{\frac{v}{V}} = \frac{VP}{v}$.

As a rule, the longitudinal extension of a body produces lateral contraction, and *vice versâ*. If a wire of cross section A and of length L undergoes an extension l, by the action of a force F, then $\frac{l}{L}$ is the measure of longitudinal extension, and $\frac{F}{A} \times \frac{L}{l}$ is its longitudinal resilience. The longitudinal resilience of a body is of great importance in physics, and is spoken of as "Young's modulus."

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CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Nitric Oxide from Atmospheric Nitrogen.—Wilhelm Muthmann and Hans Hofer have investigated the formation of nitric oxide from atmospheric nitrogen by burning air in the electric flame. The current employed was obtained from a 1·5 kilowatt alternating dynamo, transformed from 25 ampères at 20 volts to 0·05–0·15 ampères at 2000–4000 volts. The temperature of the flame decreases as the distance between the electrodes is increased. Muthmann and Hofer measured the temperature of the flame by the amount of dissociation caused in carbon dioxide by the current passing through it under the same conditions as in the air. The following were obtained under the conditions tabulated:—

Temperature.	Distance between electrodes.	Amps. in primary circuit.	Volts in primary circuit.
1825° C.	1 cm.	8	15
1800° C.	1·5 cm.	12	15
1590° C.	3·5 cm.	20	17

In all cases the proportion of nitric oxide was greatest when the flame was smallest and its temperature highest. When the distances between the electrodes were 0·4, 1·0, and 1·5 cm., the corresponding percentages of nitric oxide were 6·7, 4·3, and 3·7 respectively. Muthmann and Hofer consider that it should be possible to manufacture nitric acid electrically at one quarter the cost of preparing it from Chili saltpetre, and that, owing to the large amount of energy consumed in heating the excess of nitrogen, the efficiency of the method would be greatly enhanced by working with a mixture of oxygen and nitrogen in equal proportions, and not with ordinary air.

Nitrogen from Ammonium Nitrate.—Experiment shows that the gas obtained by heating ammonium nitrate always contains nitric oxide. The latter may be removed by passing through an acid solution of a ferrous salt, or an acid solution of permanganate of potash. Both these methods of removing the nitric oxide have disadvantages. The ferrous solution is liable to give up a portion of the dissolved nitric oxide when shaken with an indifferent gas, and the permanganate gives off variable quantities of oxygen on the oxidation of the nitric oxide to nitric acid.

The best way to remove the nitric oxide is to treat the gas with a mixture of 5 volumes of a saturated solution of potassium dichromate and one volume of concentrated sulphuric acid.

A solution of sodium nitrite and ammonium nitrate in water on being heated gives off nitrogen containing 1·3 to 1·9 per cent. of oxide. If a large excess of ammonium chloride is used, the nitrogen contains only 0·9 per cent. of oxide, and in the later stages none at all. A mixture of three parts of ammonium sulphate to one of nitrite yields nitrogen containing only a trace of oxide. The presence of the ammonia seems to make the action slower, but it prevents nitric oxide forming. The addition of salts which react so as to form ammonia, such as potassium chromate, disodium hydrogen phosphate, or sodium tungstate, renders the gas free from oxide; while sulphate of iron, zinc, or copper promotes the formation of nitric oxide.

Pure nitrogen is best prepared by heating a solution of one part of sodium nitrite with 1·2 of ammonium sulphate, and one of potassium dichromate, and washing the gas by passing it through a Lunge 10 bulb tube containing dilute sulphuric acid, or a mixture of potassium dichromate and sulphuric acid.

Arsenic Pentachloride.—Arsenic pentachloride may be readily prepared in the following way. Place about 5 c.c. of purified arsenic trichloride in a dry test-tube cooled by solid carbon dioxide. Saturate the trichloride with chlorine. The crystalline trichloride (m.p. −18° C.) becomes greenish yellow in colour, and liquefies. Distil off the excess of chlorine at −31°. The residual liquid will have the composition represented by the formula $AsCl_5$. The pentachloride dissolves readily in carbon disulphide or in ether at −30°, and crystallises from them, or solidifies alone at about −40° in yellow prisms. When heated above −25° it begins to decompose, and on exposure to the air it evolves fumes of hydrogen chloride.

A Lecture Experiment.—The electrolytic preparation of sodium amalgam makes a convenient lecture experiment if the mercury cathode be contained in a porous pot dipping into the electrolyte, which may be a saturated solution of sodium chloride. The mercury, if desired, may be coated with molten naphthalene, and at a temperature of 90° an efficiency as high as 60 per cent. may be attained, the voltage required being only about 6 volts.

Liquid Silicon Hydride.—Henri Moissan gives the following new preparation of silicon hydride (Si_2H_6). When lithium silicide (Si_2Li_6) is gently heated in a current of dry hydrogen chloride, hydrogen is evolved, and a residue of lithium chloride and silicon chloride is obtained. A dilute solution of hydrochloric acid decomposes lithium silicide, with evolution of pure hydrogen; but with concentrated hydrochloric acid silicon hexahydride (Si_2H_6) is produced, and can be condensed by passing the gas into a receiver cooled to −200° by means of liquid air.

PHYSIOGRAPHY.

(STAGES 2 AND 3.)

VAPOUR PRESSURES.

NUMEROUS scientists have worked on the subject of vapour pressures. Amongst these may be mentioned Dalton, Magnus, Fairburn and Tate, and Regnault. Dalton was the first to conduct experiments in this subject with any approach to accuracy. His apparatus, however, had several defects, and was really not suitable for temperatures above 50° C. or 60° C. At a later date Regnault conducted an elaborate series of determinations of the vapour pressure of water at various temperatures. Up to 50° C. he employed a modification of Dalton's apparatus. This is shown in the figure. AB and CD are two barometer tubes dipping into a vessel E nearly filled with mercury. The upper portions of these tubes are surrounded by water contained in a metal vessel V. This vessel is provided with a window of plate glass, and also two openings at the bottom provided with rubber tubes, so that the barometer tubes can be passed through. A spirit lamp placed at a suitable distance below the bottom of the vessel V may be used to maintain the temperature practically constant for a short time at any temperature between the temperature of the air and 50° C. Regnault used this apparatus from 0° to 50°. The internal bore of the barometer tubes which he used was 14 millimetres, or a little over half an inch. A stirrer was used to ensure the temperature of the water in V being uniform, and a delicate thermometer T was employed for reading the temperatures. Both tubes AB and CD were filled with mercury and inverted in the vessel E, so that a Toricellian vacuum was produced in each tube. The tube CD was used as an ordinary barometer, and the other, AB, had a small quantity of water introduced by passing a few drops up through the mercury. When the water reached the Tori-

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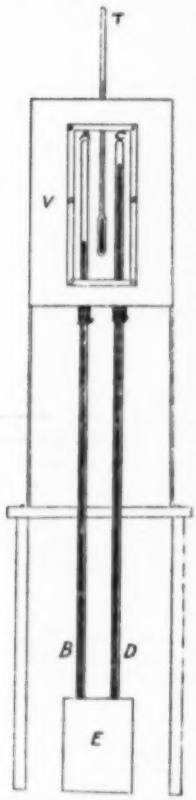
cellian vacuum above the mercury, some of it evaporated, and the vapour exerted a pressure on the mercury depressing it to a certain extent, depending on the temperature. The amount of depression caused by the vapour was ascertained by reading the difference in level between the surfaces of the two columns of mercury. Raising the temperature caused a little more of the water to evaporate and the vapour to exert a greater pressure, while lowering the temperature caused some of the vapour to condense and the depression of the mercury column to become less. In these experiments the vapour was saturated—that is, the space above the mercury contained as much vapour as it was capable of doing under the conditions. Of course, if no water in the liquid state remained above the mercury, a rise in temperature would tend to make the space unsaturated; but since water was always present, sufficient would always evaporate to keep it saturated. The pressure exerted by the vapour would then always be the maximum vapour pressure for that temperature. Regnault's observations then consisted in reading the heights of the two columns of mercury for a series of temperatures, and in taking simultaneous readings of the thermometer.



In Dalton's apparatus the whole length of the barometer tubes was surrounded by water, and it was difficult to keep the temperature of such a long column uniform. In order to get good results uniformity of temperature was necessary, and it was for this reason that Regnault used this apparatus up to 50° C. only. At 50° C. the maximum pressure of aqueous vapour is less than four inches of mercury, but it increases rapidly as the temperature rises, and at 100° C. it is roughly 30 inches of mercury. Working up to 50° C. only, Regnault only needed then to warm a portion of the barometer tube, and the short column of water could easily be kept at a uniform temperature. Corrections had, of course, to be applied for the variation in density in the mercury due to change in temperature, and a small correction also had to be made for the short column of water on the surface of the mercury in the barometer tube AB. In order to use the apparatus for low temperatures it had to be modified. The upper end of the barometer tube containing the vapour was drawn out and connected to a three-way tube.

One limb of this tube was in communication with an air pump, and the third one with a glass globe of about 500 c.c. capacity. Inside this globe was placed a small thin walled glass bulb containing water which had been freed from air by long-continued boiling. By means of the pump the air from this globe was exhausted. A fresh supply of air which had been dried by being passed over desiccating agents in drying tubes was then admitted. The air was again exhausted, and the process repeated several times to ensure the interior of the globe being perfectly dry. The final exhaustion was carried as far as possible, and the branch tube communicating with the pump was then sealed. A small quantity of air of course still remained in the globe. The pressure exerted by this air at 0° C. was determined by filling the vessel V with ice and water, and ascertaining the difference in the heights of the two columns of mercury. After this had been done, the water in the small bulb was set free by heating the glass globe until the bulb burst. The space above the mercury then became saturated with vapour. This form of apparatus was available for all temperatures between 0° C. and 50° C. For temperatures below the freezing point of water the vessel V was dispensed with, and the globe was immersed in a freezing mixture, and the barometer tubes were exposed to the air of the room. It might at first be thought that this would not enable proper results to be obtained, as the temperatures of two portions of the aqueous vapour would be different. However, a little consideration will show that what would take place would be somewhat as follows:—

The reduction in temperature of the globe would cause some of the vapour to condense. As a consequence, a fresh supply of vapour would pass over from the barometer tube to the globe, and this would continue until the pressure in the tube became the same as that in the globe. Now the pressure of the vapour in the globe would be the maximum vapour pressure corresponding to the temperature of the globe, and hence the difference in level of the two mercury columns would give the correct vapour pressure.

In these experiments with this form of apparatus a correction had, of course, to be applied for the pressure due to the small amount of air left in the globe, and the readings in terms of mercury at the temperature of the room had to be reduced to 0° C. in the ordinary way. The apparatus used for higher temperatures than 50° C. will be described next month.

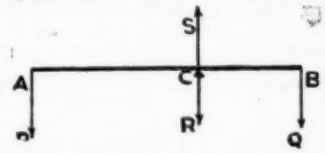
THEORETICAL MECHANICS.

Stages 2 and 3, and Intermediate Science, London University.

BY FRANK CASTLE, M.I.M.E.,

Royal College of Science; Lecturer on Mechanics, etc., Morley College, London; Author of "Elementary Practical Physics," "Practical Mathematics," etc.

Parallel Forces.—These are usually designated by the terms "like" and "unlike"—the former denoting forces which act in the same direction, and the latter those acting in opposite directions. The simplest case is that of two like parallel forces P and Q.



The magnitude of the resultant R is P + Q, its direction the same as the two given forces, and its point of application divides the line joining P and Q, so that $P \times a = Q \times b$.

$$\therefore \frac{P}{Q} = \frac{b}{a}.$$

This is also the condition of equilibrium of a lever AB, a and b denoting the perpendicular distances between the forces.

A force equal in magnitude to R, but acting in the opposite direction, is the *equilibriant*, or balancing force—the three forces P, S, and Q forming a system of forces in equilibrium.

The same method is applicable to the case of *unlike forces*. Thus if any one force (say Q) is omitted, then P and S form two unlike parallel forces, the resultant Q = S − P, and its position may be obtained by taking moments either about the point C or A.

Thus taking moments about C, we obtain $P \times a = Q \times x$ (where a is the perpendicular distance between the forces, and x is the distance of Q from C).

$$\therefore x = \frac{Pa}{Q} \text{ (1). From this } x \text{ is determined.}$$

Couple.—Eq. (1) may be written $x = \frac{Pa}{S - P}$; hence x increases as S − P decreases. When S − P is very small, x is very great; and when S − P = O, or S = P, the value of x becomes indefinitely great. In other words, no resultant can be found to balance two equal and opposite forces; these constitute what is called a *couple*, the tendency being to turn, or to rotate the body. The *moment* of a couple is the product of either force and the perpendicular distance between them; this distance is called the *arm* of the couple.

It follows at once from the preceding that the moment of a couple is the same about any point in its plane. Thus if S = P, then the moment of the couple Pa about a point distant x from P would be $P(a + x) - Px = Pa$ as before.

A couple is said to be positive when it turns, or tends to turn, a body in the opposite direction to the hands of a clock, and is negative when it acts in a clockwise direction.

Ex. 1. Prove that two couples in the same or in parallel planes will balance if their moments are equal and opposite. Show that when the wheels of a railway carriage are on the point of being skidded by the brakes, a couple of moment μWr is called into play, tending to tilt the body of the carriage on its springs in a lengthwise direction. μ = coefficient of friction, W = total weight of carriage, r = radius of wheels. (B.A., 1901.)

When the wheels are on the point of being skidded, the force F between the wheel and rail will be μW. If we imagine two equal and opposite forces, each equal to F, to act at the centre of the wheel, then we obtain a horizontal force and a couple Fr, the latter tending to tilt or turn the body of the carriage in the direction of its length.

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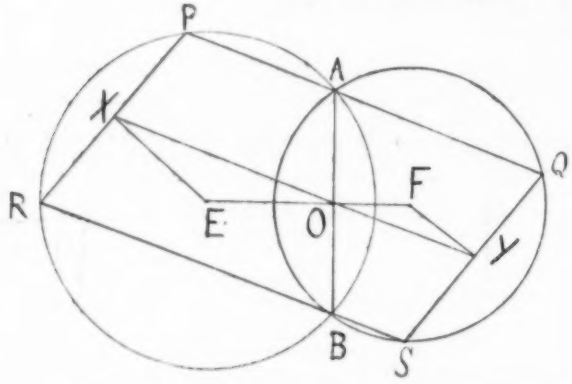
Garrett. — Two fixed circles cut one another in the points A, B, and through these points any two parallel lines PAQ, RBS are drawn, meeting the first circle in P and R, and the second circle in Q and S.

Prove that PQSR is a parallelogram. Prove also that if X, Y, O be the middle points of PR, QS, AB, then X, Y, O are on a straight line, and the ratio XO : OY is constant.

(Cambridge Junior, 1898.)



Since P, A, B and R are concyclic, therefore the angles PAB, PRB are together equal to two right angles. Similarly the angles QAB, QSB are together equal to two right angles. But the angles PAB, QAB are together equal to two right angles. Therefore the angles PRB, QSB are together equal to two right angles. Since RBS is a straight line (hypothesis), therefore PR is parallel to QS (Euclid I. 29). But PQ is parallel to RS (hypothesis); therefore the opposite sides of PQSR are parallel. Hence PQSR is a parallelogram.

Let X, Y be the middle points of PR, QS. Join XY, cutting AB in O. Since X, Y are the middle points of PR, QS, the opposite sides of the parallelogram PQSR, therefore PQ, XY, RS are parallel.

Hence $AO : OB = PX : XR$.

Therefore $AO = OB$.

Let E, F be the centres of the circles PAB, QAB. Join EF. Then since the line joining the centres of two intersecting circles bisects their common chord, therefore EF passes through O.

Join EX, FY. Since E is the centre of the circle PAB, and X is the middle point of the chord PR, therefore EXP is a right angle. Similarly FYS is a right angle. But the angle PXO is equal to the alternate angle OYS. Therefore the remaining angle OXE is equal to the remaining angle OYF. Again, the angle EOX is equal to the angle FOY (Euclid I. 15). Hence the triangles OEX, OFY are similar. Therefore $XO : OY = EO : OF$. Now E, O, F are fixed points, therefore the ratio EO : OF is constant. Hence the ratio XO : OY is constant.

A. M.—The *method* of Euclid III. 33 was probably intended to be used. It is not necessary to employ any proposition beyond Euclid, Book I., either in construction or proof.

Tadpole.—If a triangle ABC, right angled at C, and having the side opposite A double that opposite B, be suspended successively by A and C from a peg in a vertical wall, find the angle between the two positions of AC.

Let D be the middle point of BC. Then the centre of gravity of the triangle ABC is in AD. Hence when the triangle is suspended from A, the line AD will be vertical. Therefore AC will make an angle with the vertical equal to the angle DAC. But since BC = 2AC, and D is the middle point of BC, therefore DC = CA. But ACD is a right angle. Therefore CAD is half a right angle.

Again, let E be the middle point of AB. Then when the triangle is suspended by C, CE will be vertical, and CA will make an angle with the vertical equal to ECA. Because AB is the hypothenuse of the right-angled triangle ABC, and E is the middle point of AB, therefore EA = EB = EC. Therefore the angle ECA is equal to the angle EAC.

Hence the angle between the two positions of AC will be equal to the sum of the angles DAC and EAC—that is, equal to $45° + A$.

Kindly observe Rule 1.

Holly.—We agree with your surmise that the "100 yards" of question is probably a misprint for "100 feet," otherwise the question appears to be indeterminate.

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Ralpho.—If $f(x) = ax^2 + bx + c$, show that $f(x+1) + f(x-1) = 2f(x) + 2a$.

Since $f(x) = ax^2 + bx + c$,

$\therefore f(x+1) = a(x+1)^2 + b(x+1) + c$,

and $f(x-1) = a(x-1)^2 + b(x-1) + c$.

Hence $f(x+1) + f(x-1) = a(x+1)^2 + b(x+1) + c + a(x-1)^2 + b(x-1) + c$

$= a(2x^2 + 2) + b(2x) + 2c$

$= 2(ax^2 + bx + c) + 2a$

$= 2f(x) + 2a$.

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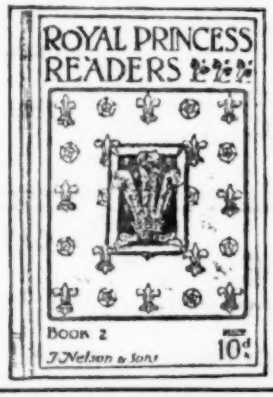

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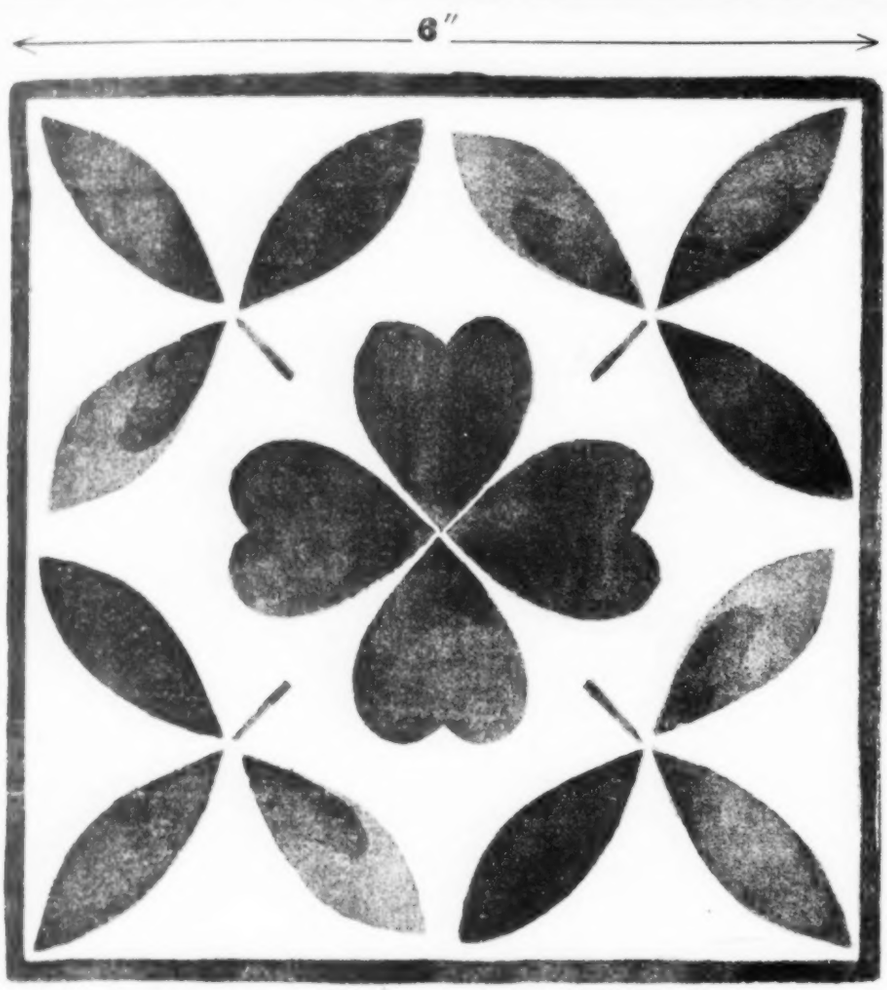
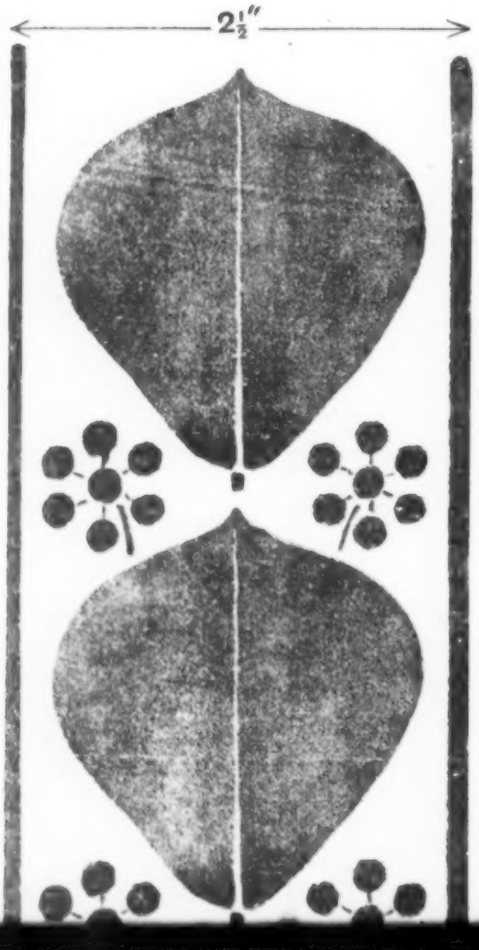


Fig. 2

5 X 3

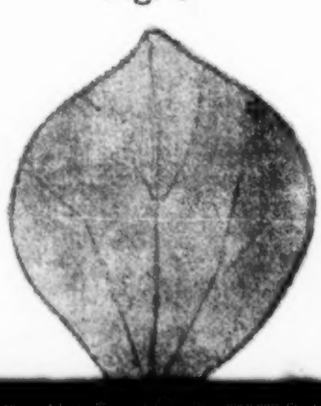
Fig. 1

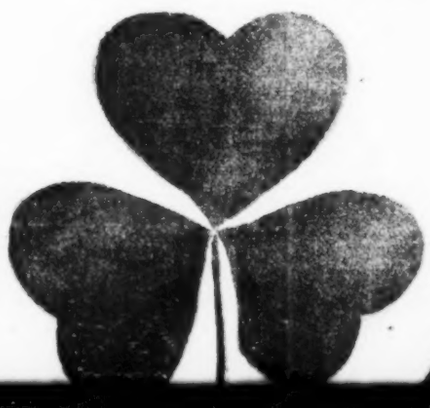


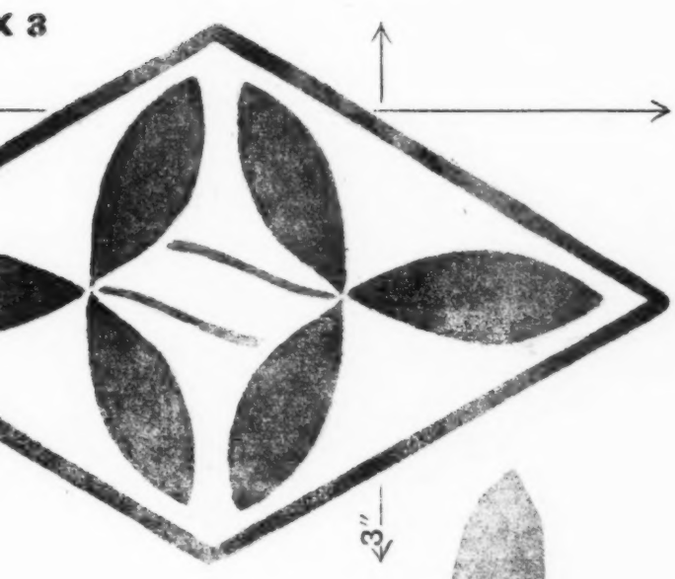
FLOWERING IVY

Fig. 7

Fig. 10
WOOD SORREL







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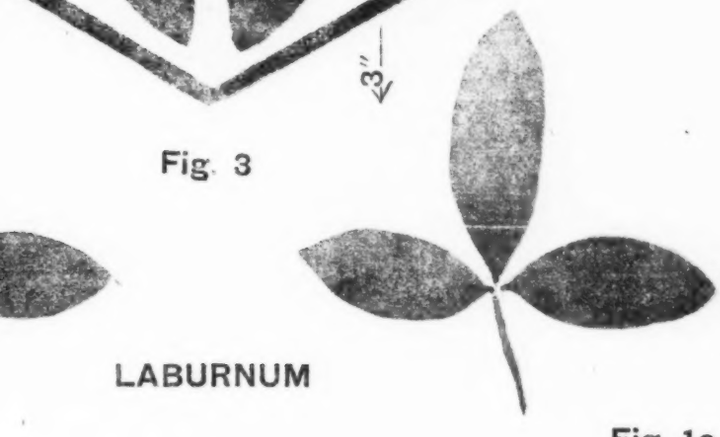


LABURNUM

Fig. 1a

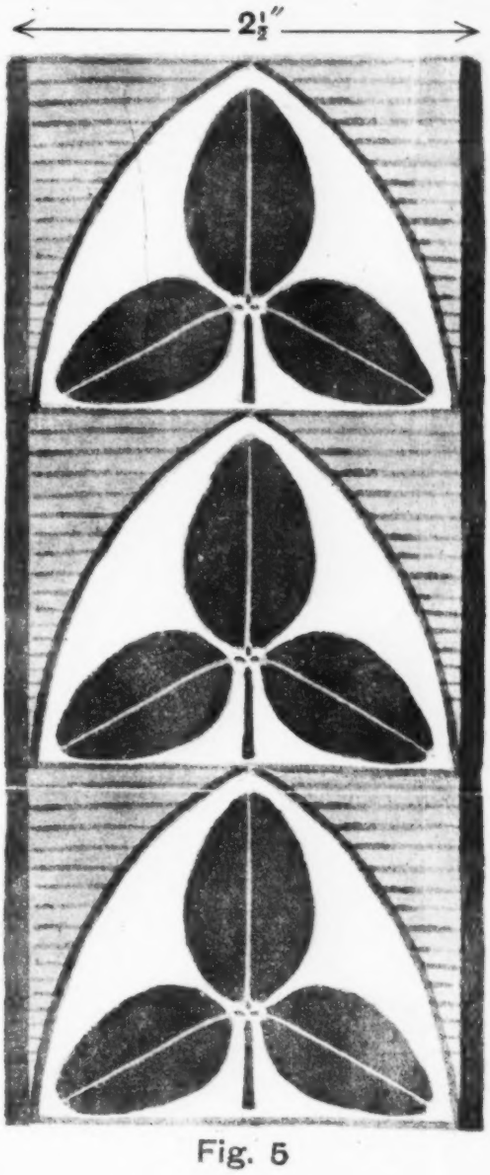


Fig. 5

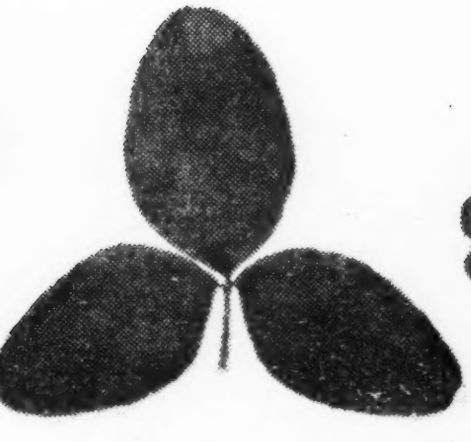
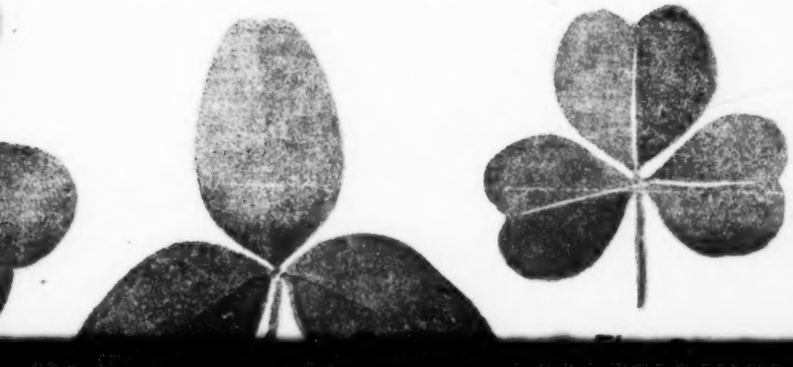
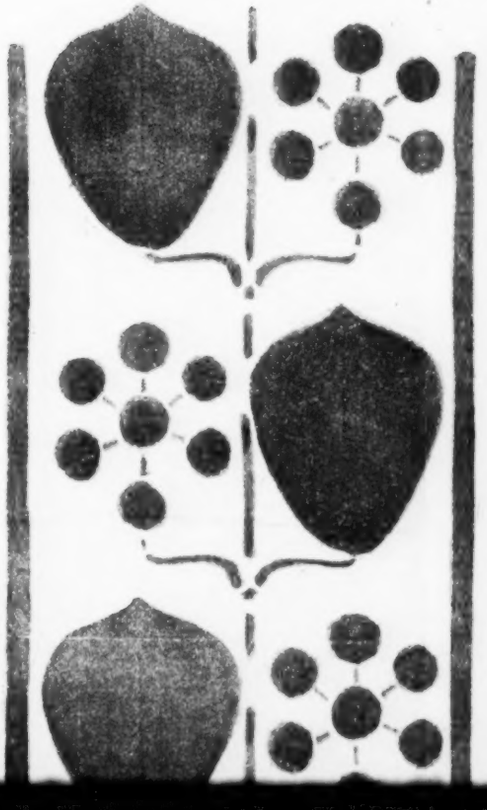


Fig. 4

Fig. 6

CLOVER





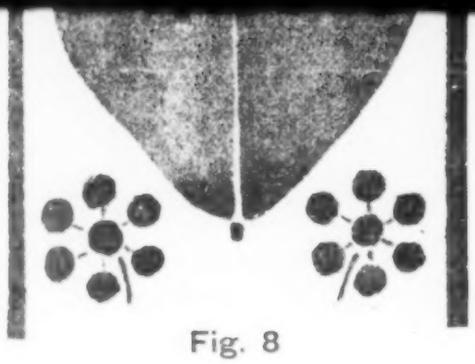


Fig. 8

Fig. 7a

Fig. 10a

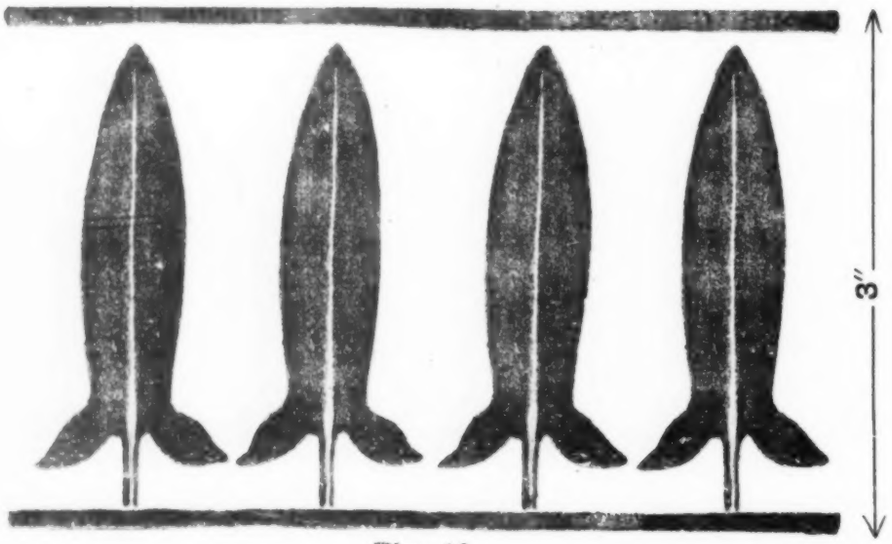


Fig. 14

Fig. 13

COMMO

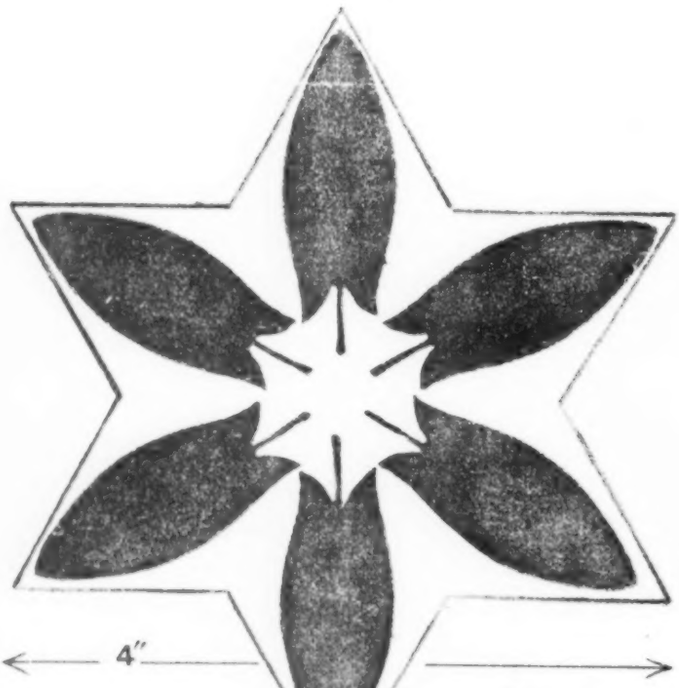


Fig. 16

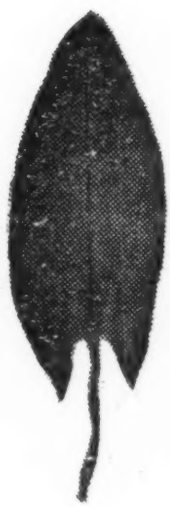


Fig. 15

Fig

The leaf forms must first be DRAWN FROM NATURE, either by direct brush-drawing, as Figs. 1a, 4a, 6a, 10a, 15b, or by first carefully sketching the form with pencil, and then tinting the space, as Figs. 7a and 15a. The Drawing should not be exactly the same size as the original. Supply each pupil with a leaf as far as practicable. The essence of the training lies in the individual study

SIMPLE LEA

AND THE

ADAPTATION TO

Fig. 4a

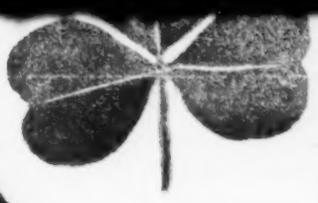


Fig. 6a

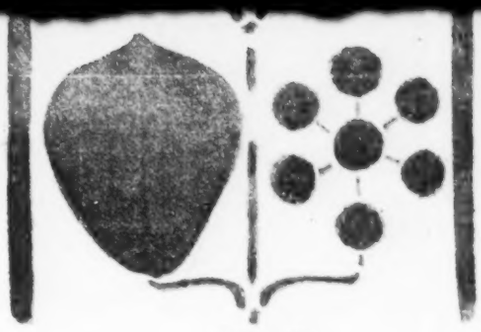


Fig. 9

3

COMMON SORREL

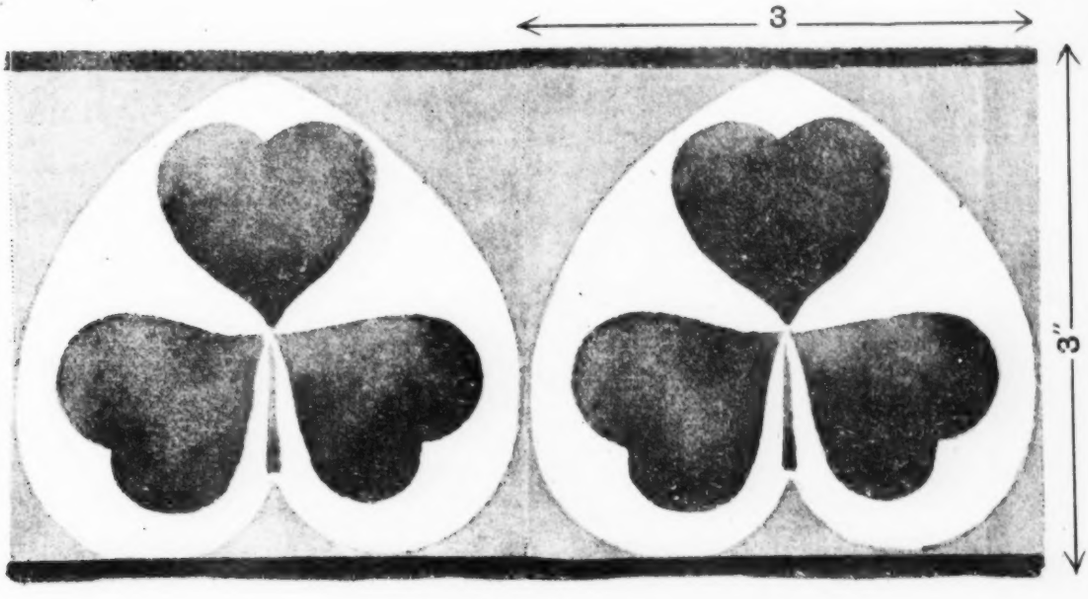


Fig. 11

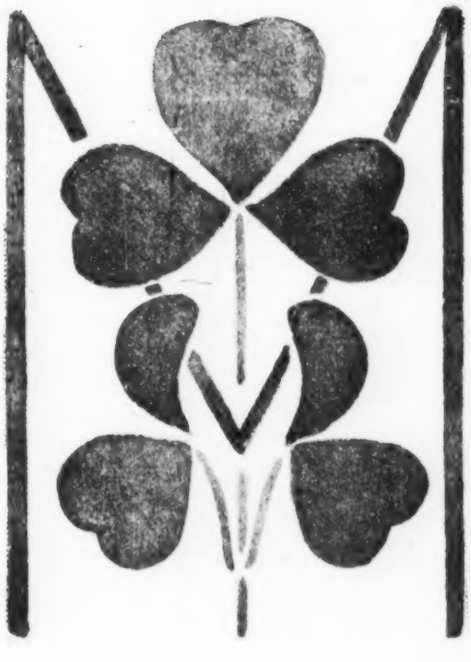


Fig. 12

Fig. 15a

Fig. 15b

LEAF FORMS

ND THEIR

N TO PATTERN.

For the pattern work, draw the bases carefully with ruler and pencil, and then put in the simple ornament directly with the brush. Suitable dimensions are suggested.

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Figs. 1, 4, 6, 7, 10, 13, and 15 were photographed from natural leaves.

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